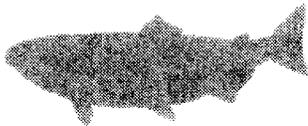
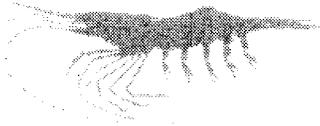
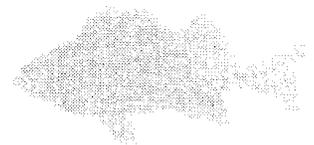
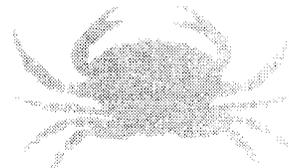
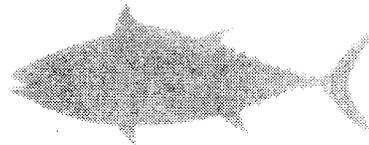


National Marine Fisheries Service

SOUTHWEST REGION300 S. Ferry Street
Terminal Island, CA 90731

SEPTEMBER 1986

**AN ECONOMIC ASSESSMENT OF
MARINE RECREATIONAL
FISHING IN SOUTHERN CALIFORNIA**NOAA-TM-NMFS-SWR-015
/U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST REGION

NOAA TECHNICAL MEMORANDUM NMFS

The National Oceanic and Atmospheric Administration (NOAA), organized in 1970, has evolved into an agency which establishes national policies and manages and conserves our oceanic, coastal, and atmospheric resources. An organizational element within NOAA, the Office of Fisheries is responsible for fisheries policy and the direction of the National Marine Fisheries Service (NMFS).

In addition to its formal publications, the NMFS uses the NOAA Technical Memorandum series to issue informal scientific and technical publications when complete formal review and editorial processing are not appropriate or feasible. Documents within this series, however, reflect sound professional work and may be referenced in the formal scientific and technical literature.

This report was prepared for the National Coalition for Marine Conservation - Pacific Region in cooperation with the United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, under the Saltonstall-Kennedy Act Cooperative Agreement No. 83-ABH-00063.

AN ECONOMIC ASSESSMENT OF
MARINE RECREATIONAL
FISHING IN SOUTHERN CALIFORNIA

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ACKNOWLEDGEMENTS

We thank Carl E. Nettleton, the contract manager, for his invaluable and continued assistance during each phase of the study. We also gratefully acknowledge the contributions of the American Fishing Tackle Manufacturer's Association, the San Diego County Fish and Wildlife Advisory Commission, the Orange County Fish and Game Commission, the Los Angeles Fish and Game Commission, the Ventura Fish and Game Commission, the Santa Barbara Fish and Game Commission, South Coast Sportfishing Magazine, and the San Diego Regional Council of the National Coalition for Marine Conservation. In addition, we would like to thank Dr. Daniel Huppert of the National Marine Fisheries Service, Mr. Steven Crooke of the California Department of Fish and Game, and Mr. Russell Porter of the Pacific Marine Fisheries Commission for their considerable assistance on this project.

INTRODUCTION

Background

Over 1 million anglers fish annually in the marine waters off the southern California coast. The diversity and year-round availability of marine recreational fishing in southern California attracts both resident and out-of-state anglers. Sportfishing activities include deepwater fishing from private, rental, and party boats, and shore fishing from beaches, banks, piers, and other man-made structures. Participation in these activities generates revenues important to many businesses, and to the state and local economies.

In recent years, fishery populations of certain species important to southern California marine anglers have declined. Overfishing and changes in environmental conditions are primary causes of declining fisheries. Population growth, tourism, and greater consumer demand for fishery products have increased harvesting activities, thereby reducing fishery populations. Urbanization also has adversely impacted marine life in southern California.

As certain fish populations have declined, competition among different user groups for the remaining available fish has increased. Fishery managers have responded with management plans that restrict access to fishing areas and that limit catch of important recreational species. Implementation of these plans, however, often has significant social and economic consequences. Reliable data are needed to adequately assess these effects.

Federal and state efforts in recent years have greatly enhanced the data available for fishery management in southern California. Angler surveys conducted annually by the National Marine Fisheries Service (NMFS) in cooperation with the states provide valuable information on participation, effort, and catch by recreational fishermen. Other important efforts include ongoing monitoring of commercial and recreational fishing activities by the California Department of Fish and Game, and recent studies on angler expenditures (USFWS 1983) and related economic activity (Centaur Associates 1983).

Despite these and other developments, data are generally insufficient to fully evaluate the important social and economic consequences of fishery management actions. The satisfaction or value derived from fishing, above and beyond out-of-pocket expenditures, is an important yet often inadequately considered component of economic impact. These benefits, which occur primarily

because fisheries are public resources with limited, if any, access costs are also referred to as user value or consumer surplus.

Previous studies on marine recreational fisheries (Huppert and Thomson 1984; Energy and Resource Consultants 1985; Bell et al. 1982) suggest that the user values of marine recreational fishing are significant. These values have important implications to resource allocation decisions and should be fully considered in the development of fishery management plans.

Study Objectives

The purpose of this study is to investigate the economic importance of marine recreational fishing in southern California. The study focuses on recreational fishing activity that originated from or that occurred in marine waters between Point Conception and the Mexican border during 1983 (see Figure 1).

Relevant economic measures are developed to derive the gross economic value of saltwater angling in southern California and to identify important economic impacts associated with this activity. Specific study objectives are as follows:

- 1) Estimate total participants and the number of trips by mode of fishing in southern California
- 2) Estimate per trip and aggregate angler expenditures by mode of fishing
- 3) Estimate per trip and aggregate net benefits (i.e., user value) by mode of fishing
- 4) Estimate direct and indirect employment and income effects at the state level of angler expenditures
- 5) Evaluate key factors that influence participation in marine recreational fishing in southern California

Research Plan

The research was conducted in two phases. Existing studies on marine recreational fishing in southern California (USFWS 1980; NMFS 1983; NMFS 1984; and Centaur Associates 1982) were reviewed in Phase 1. Data on participation, angling effort, catch, angler expenditures and fishing-related economic activity were compiled to profile the industry. Important data deficiencies also were identified.

The focus of Phase 2 was to collect and analyze original data on marine recreational fishing participation in southern California. A mail questionnaire was designed to collect sufficient information to estimate, with the use of appropriate economic and statistical models, the demand for and benefits of marine recreational fishing in southern California by mode of activity. Data analytic techniques were used to evaluate key determinants of participation and fishing mode choice.

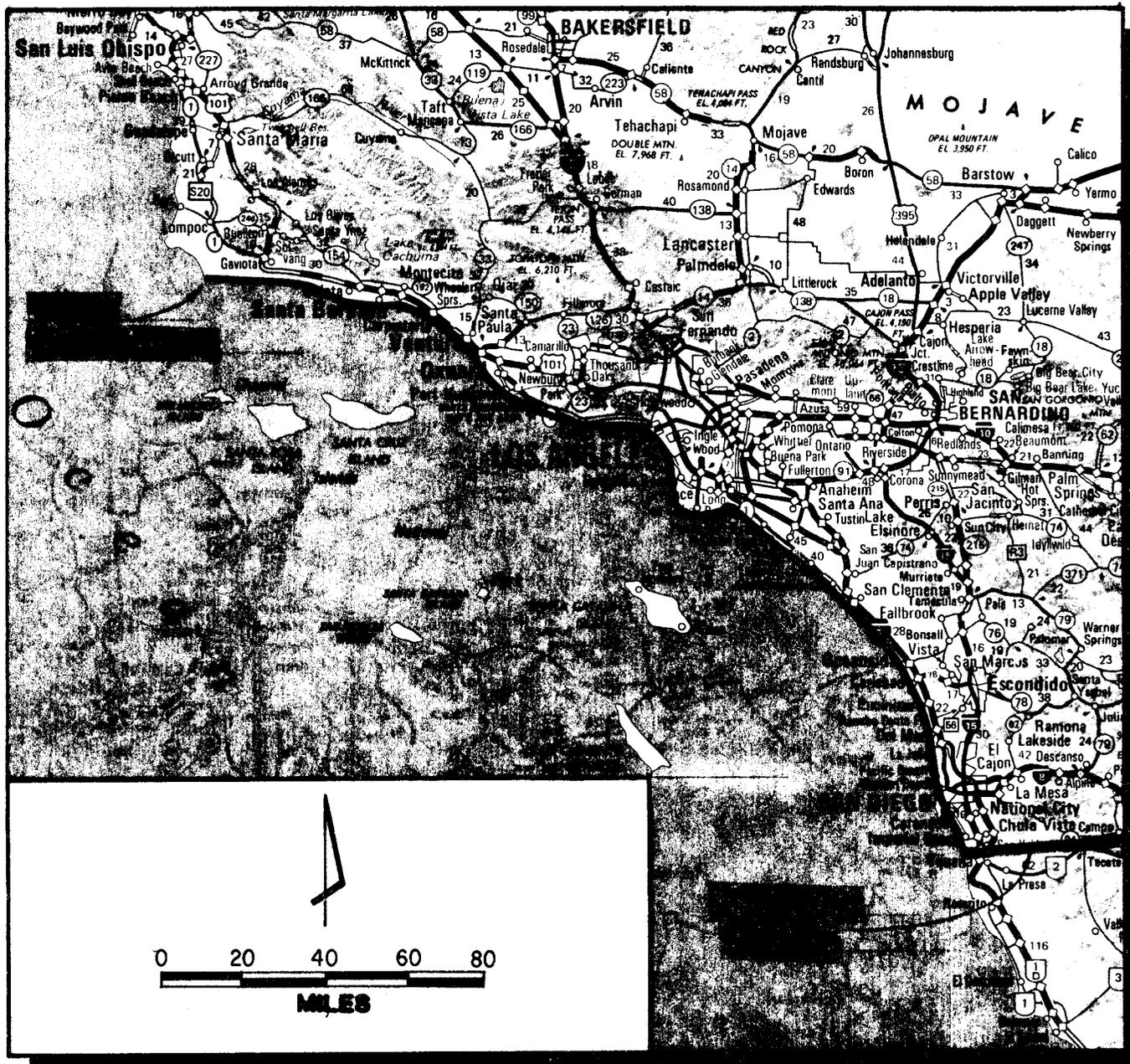


FIGURE 1. STUDY AREA

METHODS

Survey Design

A respondent-administered questionnaire (Appendix A) was designed to collect information on anglers and 1983 fishing participation. Four modes of saltwater sportfishing were considered: party/charter boat, rental boat, shore, and private boat fishing. Shore fishing was further divided into beach/bank fishing and fishing from man-made structures (e.g., piers, jetties, etc.). Trip-specific questions were developed for party/charter boat and rental boat fishing; questions regarding the typical trip were developed for shore and private boat fishing. Information on the number of trips taken, distance from residence to fishing or dock site, travel time, catch, and expenditures was requested. Each section on saltwater fishing included a question on expected participation in response to hypothetical price increases. Demographic and socioeconomic information, including data on other activities of anglers, also was requested.

A draft survey instrument was pretested in San Diego at a Regional Council meeting of the National Coalition for Marine Conservation. Fourteen council members were surveyed and participated in a discussion of the questionnaire. Results of the pretesting were reviewed and the questionnaire subsequently revised.

The target population for the survey was anglers who in 1983 either fished in southern California marine waters or who departed from a landing or dock in the coastal area between Pt. Conception and the Mexican border. Important characteristics of this fishing population, including the proportion of resident and nonresident anglers, the distribution of trips by mode of fishing, and important demographic and socioeconomic information had been identified in previous studies (NMFS 1983 and KCA Research 1983). These population parameters became important factors in selecting an appropriate survey population.

Limited survey funds necessitated the use of a sampling frame with a high probability of including participating anglers. Sportfishing clubs and associations and subscribers to sportfishing magazines were identified as two potential survey groups. Members of sportfishing clubs and associations, however, were determined to be less representative of the general marine sportfishing population.

Several sportfishing magazines indicated an interest in participating in the survey. Readership characteristics were then evaluated in terms of potential fishing participation within

the study area, diversity in fishing activity across modes, and resident and nonresident representation. The readership of South Coast Sportfishing was selected as the most appropriate for the survey.

A current membership list was provided by South Coast Sportfishing. The list included a total of 9,986 subscribers excluding agencies and manufacturers on the complimentary list. To adequately represent this population, a sample size of 500 to 600 completed questionnaires was identified as appropriate. Assuming a 20 percent response rate, a mailing of 3,000 questionnaires was estimated.

A systematic sampling technique was used to develop the survey sample. The sampling frame was stratified by 3-digit ZIP code areas to obtain greater representation of anglers who lived within 40 miles of the coast. After a random start, every third name was selected for subscribers in coastal areas, and every fourth name was selected for inland subscribers, including non-residents.

Data Collection

The 2,915 questionnaires were mailed between May 22, 1984 and May 24, 1984. A cover letter explaining the survey and describing a prize drawing for survey participants was included. Prizes for the drawing included rod and reel sets and passes for partyboat fishing. A postage-paid return envelope also was provided.

A follow-up reminder card (Appendix A) was mailed on June 1. By June 7, 197 questionnaires had been received. A full-page letter from the editor of South Coast Sportfishing explaining the importance of the survey and encouraging participation appeared in the June issue of the magazine. As of June 21, the final day of eligibility for the prize drawing, 1,193 questionnaires had been received. An additional 190 questionnaires were received during the following week for a total sample of 1,383. The response rate for the survey was 47.4 percent.

All returned questionnaires were reviewed and edited for completeness and appropriate responses. Survey respondents were not recontacted to obtain missing data. The survey data then were coded and entered into computer files with the use of Uniform, a database entry and management program.

Computer file data were cross-checked with information on the questionnaires to verify the accuracy of data coding and entry. Computer-assisted procedures were followed for data cleaning. Data were checked for legitimate coding and consistent values.

Data Analysis

The survey data were analyzed to estimate angler expenditures and to derive demand equations for three modes of marine recreational fishing: party/charter boat, private/rental boat, and shore. To estimate angler expenditures, average trip costs and average expenditures on durable goods and related services were calculated. Because the sample was considered somewhat unrepresentative of the general saltwater fishing population in terms of boat ownership characteristics (i.e., incidence and type of boats), weighting procedures were used to derive average boat-related expenditures.

To estimate demand equations, both the modal participation decision and the recreation intensity decision were analyzed. A logit model was used with categorical data on demographic and socioeconomic characteristics of respondents to estimate the probability of participating by mode. A logit model also was used to analyze boat ownership, considered an important influence on fishing demand.

The intensity or frequency of participation was evaluated by regression analysis using a maximum likelihood procedure. The number of trips taken in each mode was analyzed as a function of catch, income, and travel and time costs. A semi-log functional form was used with the survey data for the estimation.

FINDINGS

Marine Recreational Fishing Activity

Participation and Effort

1983 Fishing Activity. As shown in Table 1, the number of anglers who fished in southern California marine waters in 1983 is estimated at 1,491,000. Of this total, an estimated 1.11 million, or 74.6 percent, were residents of southern California coastal counties; an estimated 36,000, or 2.4 percent, were California residents who did not live in southern California coastal counties. Out-of-state residents comprised an estimated 343,000, or 23.0 percent, of the total participants. The estimated number of state residents who participated represented approximately 5.9 percent of the total state population in 1983; participants from southern California represented approximately 7.7 percent of the region's 1983 population.

The number of fishing trips by marine recreational anglers in 1983 is estimated at 5,039,000. Of this total, southern California coastal residents made an estimated 4,534,000 trips, or 90 percent of total trips; noncoastal residents made an estimated 71,000 trips, or 1.4 percent of the total trips; and out-of-state residents made an estimated 473,000 trips, or 8.6 percent of the total. For those who fished in the study area in 1983, coastal residents took on average 4 trips per participant; noncoastal residents took on average 2 trips per participant; and out-of-state residents took on average 1.4 trips per participant.

The distribution of 1983 fishing trips by mode of fishing is also shown in Table 1. The four fishing modes include man-made structures such as piers, docks, and jetties; beaches and banks; party and charter boats; and privately-owned and rental boats. Of the approximately 5 million fishing trips in 1983, 1.12 million, or 22 percent, were to man-made structures; 776,000, or 15 percent, were to beaches and banks; 1.23 million, or 24 percent, were on party and charter boats; and 1.91 million, or 38 percent, were on private and rental boats. Trips on private boats represent the vast majority of private/rental boat trips.

The distribution of trips among modes was significantly different for state and out-of-state residents. As shown in Table 1, the predominant mode for participants from California was private/rental boat fishing, accounting for an estimated 39 percent of total trips. For out-of-state participants, the predominant mode was party charter boat fishing, accounting for an estimated 41 percent of total trips.

Table 1. 1983 Participation and Angling Effort in Southern California Marine Waters¹

	State Residents		Out-of-State	Total
	Coastal ²	Noncoastal ³		
<u>PARTICIPATION</u>				
Number of Anglers	1,113,000	36,000	343,000	1,491,000
Percent of Total	74.6	2.4	23.0	100
<u>TOTAL ANGLING EFFORT</u>				
Number of Trips	4,534,000	71,000	433,000	5,039,000
Percent of Total	90.0	1.4	8.6	100
<u>ANGLING EFFORT BY MODE</u>				
Man-made Structures				
Number of Trips	1,032,000	13,000	79,000	1,124,000
Percent of Total	91.8	1.2	7.0	100
Beach/Bank				
Number of Trips	680,000	10,000	86,000	776,000
Percent of Total	87.6	1.3	11.1	100
Party/Charter Boats				
Number of Trips	1,045,000	9,000	176,000	1,229,000
Percent of Total	85.0	.7	14.3	100
Private/Rental Boats				
Number of Trips	1,777,000	39,000	92,000	1,908,000
Percent of Total	93.1	2.0	4.8	99.9

¹ Estimates rounded to the nearest thousand; totals are accumulated from original estimates and then rounded to the nearest thousand.
² Includes anglers who lived in a southern California coastal county.
³ Includes state anglers who did not live in a southern California coastal county.

Source: National Marine Fisheries Service, Draft Recreational Fishery Statistics Survey, Pacific Coast, 1983.

In addition to recreational fishing that occurred in southern California marine waters in 1983 (Table 1), some fishing in Mexican waters originated from southern California ports. These trips are not included in Table 1. An estimate of these trips is needed, however, to comprehensively assess the economic importance of marine recreational fishing originating in southern California.

In 1983, all fishing in Mexican waters required a fishing permit. These permits were issued by the Mexican Department of Fisheries and were valid for only 1 day. For multiple day trips, anglers were required to purchase a license for each day they were within Mexican waters. Consequently, the number of licenses issued during the year approximates the number of angler days in Mexican waters.

The Mexican Department of Fisheries issued approximately 144,600 1-day permits in 1983 (Western Outdoor News 1984). Of these permits, 103,500 or 72 percent were issued to anglers on party/charter boats and an estimated 41,100 went to private boat anglers.

Recent Trends. Estimated participation and recreational angling effort in southern California marine waters between 1980 and 1983 are compared in Table 2. As shown, participation and angling effort peaked in 1980, with an estimated 2,408,000 participants and 8,944,000 trips, respectively. Participation was lowest in 1981, with an estimated 1,367,000 participants; effort was lowest in 1983, with an estimated 5,039,000 trips.

A dramatic decline in both participation and angling effort after 1980 is indicated by data in Table 2. The economic recession and changes in species availability are considered possible causes of the significant decline. Other noteworthy trends indicated by Table 2 are the sharp decline in beach and bank fishing from 1980 to 1982, and the apparent instability in the demand for party/charter boat fishing over the 4-year period.

Catch

To most recreational anglers, the satisfaction derived from fishing is dependent upon fishing success. As previously mentioned and discussed further in following sections, satisfaction derived is an important component of the economic value of marine recreational fishing. The following profile of species caught by recreational anglers in southern California in 1983 provides a background for this analysis.

As shown in Table 3, an estimated 24.6 million fish were caught by marine recreational anglers in southern California in 1983. The top three species caught in all modes combined were Pacific mackerel, rockfish, and kelp bass and accounted for 55 percent of the total catch by recreational anglers in 1983. The species caught most frequently for each mode are also shown in Table 3.

Table 2. Participation and Recreational Angling Effort in Southern California Marine Waters (1980-1983)

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
<u>Participation</u>				
State residents	1,801,000	1,062,000	1,294,000	1,149,000
Out-of-state residents	607,000	305,000	438,000	343,000
Total participants	2,408,000	1,367,000	1,732,000	1,491,000
<u>Angling Effort by Mode</u>				
<u>Man-made structures</u>				
Number of trips	2,961,000	1,288,000	1,370,000	1,124,000
Percent of total annual effort	33%	25%	24%	22%
<u>Beach/bank</u>				
Number of trips	1,745,000	1,075,000	765,000	777,000
Percent of total annual effort	20%	21%	13%	15%
<u>Party/charter boats*</u>				
Number of trips	1,698,000	991,000	1,825,000	1,229,000
Percent of total annual effort	19%	20%	32%	24%
<u>Private/rental boats*</u>				
Number of trips	2,540,000	1,705,000	1,767,000	1,909,000
Percent of total annual effort	28%	34%	31%	38%
Total annual angling effort	8,944,000	5,059,000	5,727,000	5,039,000
	100%	100%	100%	100%

*Estimates exclude fishing in Mexican waters.

Source: "Marine Recreational Fishery Statistics Survey, Pacific Coast, 1980-1983" published by U. S. Department of Commerce, National Marine Fisheries Service.

Table 3. Estimated Total Catch of Top Species Groups by Mode of Fishing in Southern California Marine Waters (1983)

Top species groups	Man-made Structures		Beach/Bank		Party/Charter		Private/Rental		All Modes		
	# of fish caught	% of total catch by mode	Top species groups	# of fish caught	% of total catch by mode	Top species groups	# of fish caught	% of total catch by mode	Top species groups	# of fish caught	% of total catch by mode
Pacific mackerel	998,000	39	Surfperch	549,000	47	Pacific mackerel	3,716,000	36	Pacific mackerel	7,755,000	31
Croaker	369,000	14	Croaker	150,000	13	Kelp bass	1,630,000	16	Rockfish	3,050,000	12
Surfperch	256,000	10	Rockfish	66,000	6	Rockfish	1,511,000	15	Kelp bass	2,858,000	12
SUBTOTAL	1,588,000	63	SUBTOTAL	765,000	66	SUBTOTAL	6,857,000	67	SUBTOTAL	13,667,000	55
Other species	966,000	37	Other species	397,000	34	Other species	3,462,000	33	Other species	10,958,000	45
TOTAL	2,554,000	100	TOTAL	1,162,000	100	TOTAL	10,319,000	100	TOTAL	24,625,000	100

Source: NMFS, Draft Marine Recreational Fishery Statistics Survey, Pacific Coast, 1983.

The estimated annual catch by mode of fishing for 1980 through 1983 is presented in Table 4. Of the estimated annual catch in 1983, 10.3 percent was caught from man-made structures, 4.7 percent from beaches and banks, 42.0 percent from party and charter boats, and 43.0 percent from private and rental boats.

As indicated by the data in Table 4, total catch varied considerably over the 4-year period. The relative percentage of the annual catch for the shore modes decreased continuously (with the exception of beach/bank fishing in 1981) from 1980 to 1983. Although the data on catch for the boat modes are less revealing, a general increasing trend in the relative percentage of catch is suggested.

The estimated average catch per trip for each mode is presented in Table 5. The data in this table suggest that, whereas the average catch per trip for all modes appears generally stable, the trend in average catch per trip for individual modes is generally decreasing. The increases in catch of rockfish and mackerel, possibly resulting from the unusual offshore conditions of El Nino, may explain the higher average catch per trip in 1982 and 1983 for party/charter boat fishing.

Demand for Marine Recreational Fishing

The following section on the Demand for Marine Recreational Fishing discusses the economic modelling approach used to estimate the net benefits of fishing, and presents the results of the statistical analysis. The nontechnical reader may encounter difficulty with some of the material. Because key findings of this analysis are presented in the Conclusion section of the report, this section can be skimmed or skipped entirely without a significant loss of comprehension. The reader, however, should proceed to the following section on the Economic Value of Activity.

Modelling Approach

The modelling objective was to estimate demand functions for three modes of marine recreational fishing--party/charter boat, private/rental boat, and shore. Ideally, the demand for fishing should be analyzed in the context of recreation at specific sites. The overall demand for a given mode is viewed as an aggregation of demand at individual sites. The best way to model this demand is to estimate site-specific demand functions. The limitations inherent in our mail survey, however, precluded the collection of data on individual site visitation; consequently, we modelled demand aggregated over all sites.

For each mode, the recreation decision was divided into two components: a participation decision of whether to participate in a given mode, and a recreation intensity decision of how often to participate in the mode, given the individual participated.

Table 4. Estimated Catch by Mode of Recreational Fishing in Southern California Marine Waters (1980-1983)

Mode	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Man-made structures				
- Estimated number of fish caught	9,319,000	3,479,000	3,605,000	2,554,000
- Percent of annual catch	21.4	14.5	11.5	10.3
Beach/bank				
- Estimated number of fish caught	3,205,000	1,897,000	1,686,000	1,162,000
- Percent of annual catch	7.4	7.9	5.5	4.7
Party/charter boat				
- Estimated number of fish caught	12,589,000	7,274,000	15,365,000	10,319,000
- Percent of annual catch	28.9	30.3	49.7	42.0
Private/rental boat				
- Estimated number of fish caught	18,386,000	11,372,000	10,292,000	10,590,000
- Percent of annual catch	42.3	47.3	33.3	43.0
All modes				
- Estimated number of fish caught	43,499,000	24,022,000	30,948,000	24,625,000
- Percent of annual catch	100.0	100.0	100.0	100.0

Source: NMFS, Marine Recreational Fishery Statistics Survey, Pacific Coast, 1980-1983.

Table 5. Average Number of Fish Caught Per Trip by Mode of Fishing (1980-1983)

<u>Mode of Fishing</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Man-made structures	3.14	2.70	2.63	2.27
Beach/bank	1.83	1.76	2.20	1.49
Party/charter boat	7.41	7.34	8.41	8.39
Private/rental boat	7.23	6.66	5.82	5.54
All modes	4.86	4.74	5.40	4.88

Source: NMFS, Marine Recreational Fishery Statistics Survey, Pacific Coast, 1980-1983.

Although both decisions could be modelled as a simultaneous choice using the advanced techniques of general corner solution analysis (see Chapter 9 of Bockstael, Hanemann, and Strand [1984]) we modelled these decisions as sequential choices. The mode participation decision was analyzed as a function of the individual's demographic and socioeconomic characteristics; the mode intensity decision was evaluated as a function of income, catch, travel costs, and time costs.

In addition to these recreation decisions, a decision on boat ownership is made by the angler. As illustrated in Figure 2, the individual was treated as deciding first whether to purchase a boat for the season and then, conditional on this choice, deciding in which fishing modes to participate and the frequency of participation. Consequently, the modal participation and intensity decisions are modelled separately for boat owners and nonowners. An equation which explains the incidence of boat ownership as a function of demographic and socioeconomic variables also was estimated.

The Boat Ownership Decision

Of the 1,361 individuals who responded to the boat ownership question in the survey, 711 (52.2 percent) owned one or more boats in 1983. The results of estimating a logit model of boat ownership is presented in Table 6. As indicated, important factors that increase the probability of boat ownership include ownership of trolling gear, participation in camping, and participation in scuba diving. Factors that decrease the probability of boat ownership are readership of the sports section of a daily newspaper, residence in Los Angeles County, and ownership of flycasting gear.

Modal Participation

In the survey, 672 of the 711 boat owners (94.5 percent) and 627 of the 650 nonboat owners (96.5 percent) participated in one or more modes of saltwater fishing. The marginal participation probabilities (i.e., the probability of participation in any one mode) are presented in Table 7. As shown, 90.6 percent of the boat owners participated in private boat fishing, while 61.9 percent participated in party/charter boat fishing. For nonboat owners, not surprisingly, the proportions were considerably different: 46.3 percent participated in private boat fishing, whereas 91.2 percent participated in party/charter boat fishing. In both groups, the proportion participating in rental boat fishing was very small (4.5 percent and 11.2 percent, respectively), resulting in a decision to omit this mode from further analysis.

Most individuals participated in more than one mode of saltwater fishing. Consequently, a joint logit model of the type employed by Caswell and McConnell (1980) was considered appropri-

Table 6. Analysis of Factors Related to Boat Ownership

Factors Related to Boat Ownership

Increase Probability of Boat Ownership¹

- Participation in camping (4)
- Ownership of trolling gear (3)
- Readership of business periodical (8)
- Years experience in saltwater angling (6)
- Readership of outdoor magazine other than fishing magazine (9)
- Participation in scuba diving (1)

Decrease Probability of Boat Ownership¹

- Resident of Los Angeles County (2)
- Readership of sports section of daily newspaper (5)
- Ownership of flycasting gear (7)
- Participation in indoor sports (10)

Final Parameter Estimates²

<u>Explanatory Variable</u>	<u>Beta</u>	<u>Std. Error</u>	<u>Chi-Square</u>	<u>P</u>	<u>R</u>
Intercept	1.179	0.320	13.51	0.0002	
(1) Scub	0.573	0.271	4.48	0.0343	0.038
(2) Dumla	-0.618	0.122	25.29	0.0000	-0.117
(3) Trol	0.811	0.193	17.62	0.0000	0.096
(4) Camp	0.628	0.130	23.35	0.0000	0.112
(5) Sport	-0.681	0.159	18.27	0.0000	-0.098
(6) Xpersw	0.201	0.059	11.50	0.0007	0.075
(7) Flyf	-0.597	0.148	16.18	0.0001	-0.091
(8) Busi	0.462	0.133	12.02	0.0005	0.077
(9) Outdr	0.402	0.131	9.37	0.0022	0.066
(10) Indo	-0.333	0.134	6.15	0.0132	-0.049

¹In descending order of significance.

²Logit model results

Table 7. Modal Participation Probabilities

	<u>Boat Owners</u> ¹	<u>Nonboat Owners</u> ²
Marginal Participation Probabilities		
Party/Charter Boat	.619 ³	.912
Private Boat	.906	.463
Shore	.351	.643
Rental Boat	.045	.112
Joint Participation Probabilities		
Party/Charter, Private	.533	.410
Party/Charter, Shore	.259	.392
Private, Shore	.315	.220
Party/Charter, Private, Shore	.231	.204

¹ 672 observations.

² 627 observations.

³ Probabilities represent the proportion of survey respondents who participated in this mode of fishing.

ate to analyze modal choices simultaneously. The joint participation probabilities presented in Table 7, however, suggest that, as an approximation, these choices can be treated independently. For example, the proportion of boat owners participating in both charter and private boat fishing is 53.3 percent, which is similar to the proportion predicted by treating party/charter and private boat fishing as independent choices, 56.1 percent ($= .619 \times .906$); the other joint probabilities in the table can be similarly approximated as the product of the marginal probabilities.

For each individual mode, a logit equation explaining the probability of participating in that mode was estimated for boat owners and nonboat owners. Demographic and socioeconomic characteristics were evaluated to explain the mode choice. The main factors that explain participation by mode for the boat owners and nonboat owners are identified in Tables 8 and 9, respectively. (Results of the logit equations are presented in Appendix B.)

For boat owners, county of residence was an important factor influencing the mode choice, particularly for private boat fishing. Participation in camping also was positively correlated with shore and party/charter boat fishing, but not with private boat fishing. The age of boat owners tended to decrease with participation in all modes.

For nonboat owners who participated in party/charter boat fishing, gear ownership was an important positive factor. Nonboat owners who participated in camping were likely to participate in shore or private boat fishing, but not in party/charter boat fishing.

Intensity of Participation

Variable Definition. As previously identified, the angler's decision on the intensity or frequency of fishing participation is evaluated as a function of certain socioeconomic variables and trip costs. Two key components of trip costs (or the price faced by the angler to fish) are time and monetary costs. Because the net benefits of fishing are derived from the estimated price coefficient, it is important that the components of the price variable are measured accurately. The methods used to define the time and monetary components of the price variable are discussed below.

Time and Its Opportunity Cost. An angler's decision to fish reflects a decision on the allocation of time. Because anglers, like other individuals, have limited amounts of time, they must decide how to allocate their time among various work and nonwork activities. Anglers who trade off the opportunity to earn income for fishing need to be distinguished from anglers who do not make this trade-off (Bockstael, Hanemann, and Strand 1984). This distinction is indicated by equations (1) and (2) in the modelling structure illustrated in Figure 2.

Table 8. Factors Related to Fishing Mode Choice For Participants Who Owned Boats

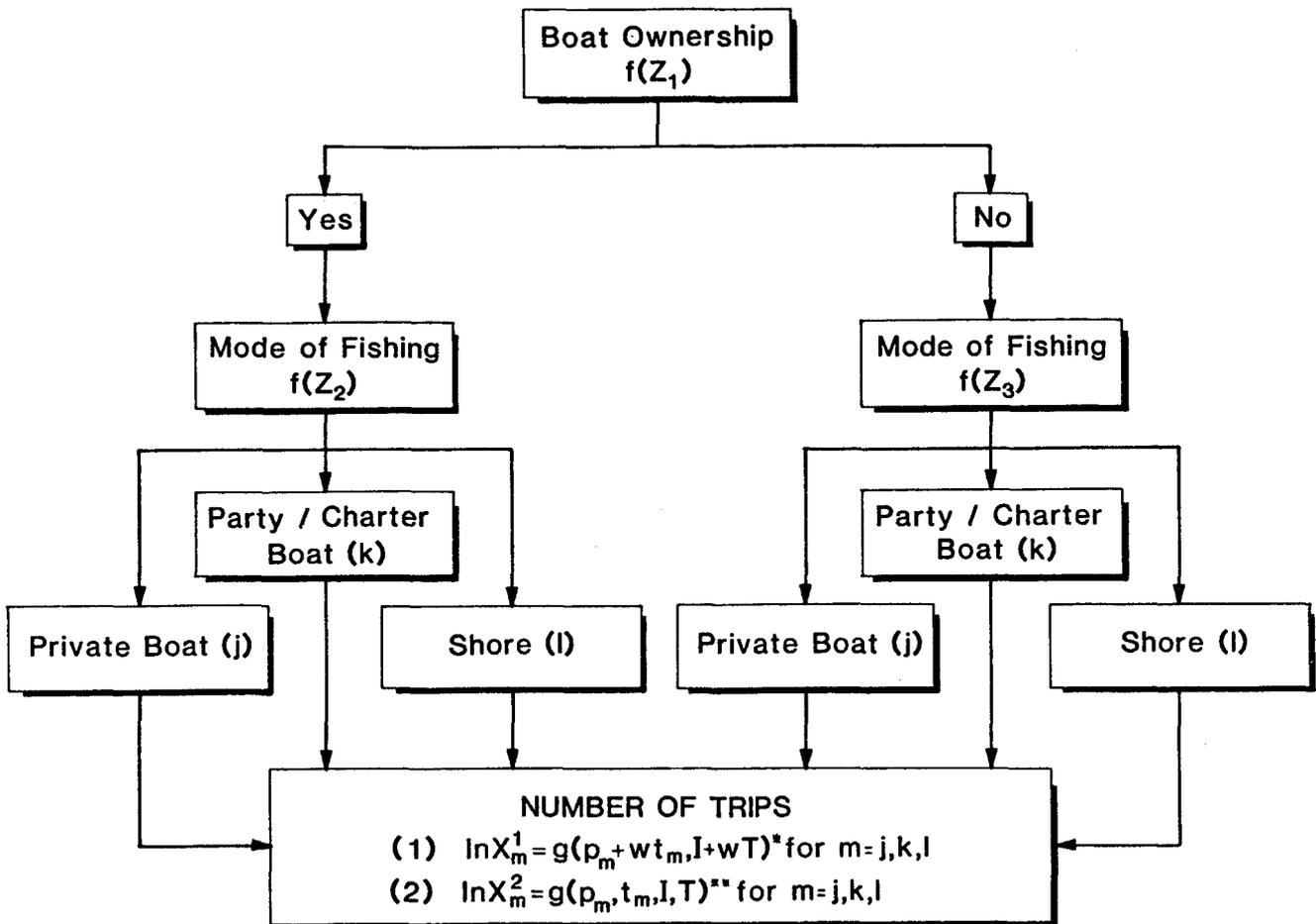
<u>Party/Charter Mode</u>	<u>Private Boat Mode</u>	<u>Shore Mode</u>
<u>Positive Factors¹</u>		
Resident of Los Angeles County	Resident of Orange County	Experience in salt-water angling
Experience in saltwater angling	Resident of Los Angeles County	Participation in camping
Student	Resident of San Diego County	Participation in swimming/surfing
Participation in camping	Resident of Riverside County	Student
Readership of spectator sport magazine	Resident of Ventura County	Readership of spectator sport magazine
Resident of San Bernardino County	Resident of San Bernardino County	Resident of Ventura County
Ownership of casting gear	Participation in musical/theatrical events	
	Participation in scuba diving	
	Participation in hunting	
	Saltwater fishing favorite recreational activity	
<u>Negative Factors¹</u>		
Participant in scuba diving	Resident of San Luis Obispo County	Age of respondent
Age of respondent	Ownership of fly casting gear	Household income
	Age of respondent	Ownership of trolling gear

¹Presented in descending order of importance.

Table 9. Factors Related to Fishing Mode Choice
For Participants Who Did Not Own Boats

<u>Party/Charter Mode</u>	<u>Private Boat Mode</u>	<u>Shore Mode</u>
<u>Positive Factors¹</u>		
Saltwater fishing favorite recreational activity	Participation in hunting	Participation in camping
Ownership of trolling gear	Participating in camping	Ownership of spinning gear
Resident of Los Angeles County	Participation in sailing	Saltwater fishing favorite recreational activity
Ownership of casting gear	Saltwater fishing favorite recreational activity	Readership of spectator sport magazine
	Readership of spectator sport magazine	
<u>Negative Factors¹</u>		
Age of respondent	Resident of San Bernardino County	Ownership of trolling gear
		Household income

¹Presented in descending order of importance.



where:

Z_i is a set of demographic and socioeconomic characteristics associated with decision i ,

$\ln X_m^1$ is the natural log of the quantity of trips demanded in the m^{th} mode by individuals with flexible work schedules,

$\ln X_m^2$ is the natural log of the quantity of trips demanded in the m^{th} mode by individuals with fixed work schedules,

p_m is the travel cost associated with the m^{th} mode,

t_m is the travel time associated with the m^{th} mode,

w is the wage rate,

T is discretionary time,

I is household income.

* For individuals who trade off the opportunity to earn income for fishing, the time and budget constraints are collapsed into a single constraint.

** For individuals who do not trade off recreation time and income (because of a fixed work week and no overtime payment), constraints are separately binding.

FIGURE 2. STRUCTURE FOR MODELLING SEQUENCE OF ANGLER'S DECISION

To investigate the opportunity cost of time, three questions were included in the angler survey:

"For the typical 1983 saltwater fishing trip, would you have been working if you hadn't gone fishing?"

(If "YES,"), "would you have received payment for that work time?"

(If "YES,"), "which category best describes the hourly rate that you would have been paid if you had been working?"

Of the 1,330 individuals who answered the first question, 511 (38 percent) said yes; of these, 487 (95 percent) also said yes to the second question. It appears, therefore, that 487 respondents did trade off recreation time against income and have a demand function of form (1); 843 (= 1,330-487) respondents, or 63 percent, did not trade off time against income and have a demand function of form (2).

Monetary Costs. Possible components of monetary costs associated with fishing trips include expenditures on transportation, food, beverages, lodging, boat fees, boat fuel, tackle, and bait. Reported expenditures on many of these items exhibited considerable variation across trips of a similar type, suggesting that certain trip expenditures may reflect endogenous choices by individuals (e.g., how much food to bring as opposed to purchase it on-site) rather than representing exogenous prices. In addition, expenditures for some items were not reported consistently, with many respondents leaving certain questions blank. Because of these data inconsistencies, only boat fees and travel expenses were included in the price variable.

Information on both travel expenses and miles travelled were collected for specific and representative trips. Reported travel expenses, however, were considered less reliable than the distance travelled and likely to result in more spurious variation. To reduce this potential source of measurement error, a "constructed" travel expense variable was computed by regressing reported travel expenses on reported distance for each mode. The regression results, which were used to calculate the implied travel cost per mile for each mode, were as follows:

	<u>Obs</u>	<u>R²</u>
<u>Party/Charter Trips</u>		
Travel Expense (\$) = 1.838 + .0854* round trip distance (miles)		
(38.16)	894	0.62
<u>Private Boat</u>		
Travel Expense (\$) = 2.596 + .1251* round trip distance (miles)		
(37.28)	821	0.63

Shore

$$\text{Travel Expense (\$)} = -1.746 + .1694 * \text{round trip distance (miles)}$$

(28.86) 489 0.63

where the t-statistic is shown in parentheses.

The price of alternative modes of fishing (i.e., cross-price terms) also was considered in the estimation of the demand equations. Because most respondents did not participate in all modes of saltwater fishing, cross-price data were not available for all participants. Although reported costs of other participants living in the same ZIP code could have been used, theoretical arguments against this approach exist. As explained in Chapter 9 of Bockstael, Hanemann, and Strand (1984), if an individual does not participate in some modes, his conditional demand function for the modes in which he does participate are (locally) independent of the prices and attributes of the nonparticipation modes; consequently, the relevant price variables are only those modes in which participation occurs.

Results. Two demand equations were estimated for each mode. The first equation was based on the theory of collapsible versus separable time and income constraints (Equations 1 and 2 in Figure 2). Cross-price variables for the other modes also were included where data were available. The resulting demand equations are presented in Table 10 for boat owners and Table 11 for nonboat owners. Two types of party/charter boat fishing were considered: trips of 1 day's duration or less, and trips longer than 1 day.

The results for boat owners (Table 10) suggest that income positively influences the number of trips taken only for party/charter boat trips greater than 1 day and for private boat trips. Three modes (party/charter boat greater than 1 day, private boat, and shore) have significant positive parameters associated with discretionary time available. A negative relationship between discretionary time and trips taken is indicated for party/charter boat trips less than or equal to 1 day. This relationship seems reasonable if more time available induces the individual to switch from 1-day trips to trips greater than 1 day or to use their boats. For all modes in which boat owners participated, the own-mode characteristics provided significant coefficients and the signs agreed with a priori expectations. That is, travel and time costs negatively influenced trips taken, and the catch of principal species sought positively influenced trips taken. Significant cross-mode interaction for boat owners occurred only for private boat trips. Catch on other modes tended to reduce the number of private boat trips taken, suggesting substitution among modes.

The results for participants who did not own boats (Table 11) were not as consistent or as often statistically significant. The demand for party/charter boat trips resulted in positive and significant coefficients for both income and discretionary time.

Table 10. Estimated Annual Demand of Boat Owners for Marine Sportfishing Trips by Mode¹

Explanatory Variable	Party/Charter Trips			Shore Trips
	1 Day or Less	Greater Than 1 Day	Private Boat Trips	
Constant	2.3406*** (4.05) ²	.1098 (.19)	2.0425*** (10.76)	1.2864*** (2.65)
Income [000s \$] ³	-.0020 (-.55)	.0047** (1.95)	.0015* (1.41)	.0011 (.34)
Available time [1000 hr]	-.1931** (-2.14)	.1665* (1.43)	.1220*** (3.47)	.1491* (1.93)
<u>Characteristics of Party/Charter Boat Trips</u>				
Travel and boat costs [\$ /trip]	-.0078** (-1.88)	-.0024*** (-2.73)	-.0000 (-.11)	-.0005 (-1.11)
Travel time [Hrs traveled/trip]	-.1579* (-1.23)	-.3428*** (-2.42)	-.0063 (-.91)	-.0092 (-.49)
Fish caught [# /trip]	.0370** (1.62)	.1095*** (2.64)	-.0524*** (-2.85)	.0115 (.14)
<u>Characteristics of Private Boat Trips</u>				
Travel costs [\$ /trip]	-.0032 (-.37)	-.0019 (-.18)	-.0032*** (-2.85)	.0006 (.18)
Travel time [Hrs traveled/trip]	-.3103** (-1.76)	.2058 (.99)	-.0515* (-1.33)	.0478* (1.67)
Fish caught [# /trip]	.0088 (.40)	.0419 (1.28)	.0359*** (3.83)	.0514 (.41)
<u>Characteristics of Shore Trips</u>				
Travel costs [\$ /trip]	-.0384*** (-3.65)	-.0069 (-.96)	-.0012 (-.82)	-.0043*** (-1.95)
Travel time [Hrs traveled/trip]	.3833*** (4.62)	-.1683 (-.98)	.0016 (.16)	-.3226*** (-2.59)
Fish caught [# /trip]	.0499** (1.80)	.0588 (.98)	-.1990*** (-6.15)	.0598*** (1.95)
NO. OF OBSERVATIONS	149	94	382	171

¹Dependent variable = natural log of quantity of trips demanded.
²t-statistic in parentheses.
³Units of measurement in brackets.
***Significant at the 5 percent level of confidence.
**Significant at the 10 percent level of confidence.
*Significant at the 15 percent level of confidence.

Table 11. Estimated Annual Demand of Non-Boat Owners for Marine Sportfishing Trips by Mode¹

Explanatory Variable	Party/Charter Trips			Shore Trips
	1 Day or Less	Greater Than 1 Day	Private Boat Trips	
Constant	1.4499*** (4.25) ²	1.3546*** (4.89)	-.7744 (-.64)	1.0824*** (2.95)
Income [000s \$] ³	.0022* (1.15)	.0037*** (2.84)	.0046 (.66)	.0024 (1.00)
Available time [1000 hr]	0.810* (1.29)	.1111** (2.07)	.1923 (1.06)	.1990*** (2.97)
<u>Characteristics of Party/Charter Boat Trips</u>				
Travel and boat costs [\$/trip]	-.0026** (-1.40)	-.0017*** (-6.14)	-.0275** (-1.92)	-.0015 (-1.62)
Travel time [Hrs traveled/trip]	-.2048*** (-2.70)	-.0636*** (-1.92)	-.4580*** (-2.16)	.1645 (1.91)
Fish caught [#/trip]	.0554*** (3.22)	.0550*** (2.68)	.1591*** (2.43)	-.0177 (-.91)
<u>Characteristics of Private Boat Trips</u>				
Travel costs [\$/trip]	-.0038 (-.66)	-.0003 (-.22)	-.0057 (-.73)	.0060 (1.93)
Travel time [Hrs traveled/trip]	-.0563 (-.76)	-.1160 (-1.34)	.0580 (.23)	-.2567 (-2.64)
Fish caught [#/trip]	.0285 (1.43)	.0402** (2.31)	.0789** (1.63)	-.0232 (-1.55)
<u>Characteristics of Shore Trips</u>				
Travel costs [\$/trip]	-.0030 (-.69)	.0003 (.15)	-.0004 (-.52)	-.0019 (-.40)
Travel time [Hrs traveled/trip]	.0161 (.80)	-.0010 (-.04)	-.2608 (-1.11)	-.2002*** (-3.77)
Fish caught [#/trip]	-.0249 (-.28)	.1395** (2.31)	-.0626 (-.88)	.1130*** (4.01)
NO. OF OBSERVATIONS	216	140	165	175

¹Dependent variable = natural log of quantity of trips demanded.

²t-statistic in parentheses

³Units of measurement in brackets.

***Significant at the 5 percent level of confidence.

**Significant at the 10 percent level of confidence.

*Significant at the 15 percent level of confidence.

The own-mode characteristics for party/charter boat trips were consistent with expectations. The demand for shore trips was positively related to the discretionary time available. The coefficient signs of own-mode characteristics for shore fishing were consistent with expectations, although the travel cost coefficient is not significantly different from zero. The demand for private boat trips by participants who do not own boats tended to be related more to the characteristics of charter boat trips than to other variables. This may indicate that persons gain familiarity with boat fishing through party/charter trips and then seek trips on friends' boats. The number of fish caught was a positive factor in the number of trips taken in all modes.

In summary, the results indicate that trips for a particular mode are positively related to the number of species caught in that mode and negatively related to time and travel costs in that mode. Interaction between modes was not too common but did suggest some substitution and complementary behavior. Income tends to have a positive influence on the number of trips taken as does total discretionary time.

The second demand equation estimated for each mode was based on equation (1) in Figure 2. It was intended to use one-third of the wage rate to measure the value of travel time for all individuals. Respondents who indicated that they would not trade off income for fishing, however, did not report their marginal wage rate; consequently, wage rate information was not available for all individuals. Alternatively, the average wage for all individuals was estimated by dividing the reported annual household income (wage plus nonwage) by 2,080 hours presumed to be worked per year. Insignificant estimates of the coefficient resulted, however. We attribute this to the errors in measuring the price variable $(p + \frac{wT}{3})$ introduced by our approximation of w for 63 percent of the sample. Accordingly, we estimated equations of the form:

$$\ln x = \alpha + \beta p + \gamma y + \delta \text{ catch} \quad (3)$$

Since the coefficient of income, γ , was generally insignificant the variable was omitted from the final version of these regressions, which are reported in Table 12.

Economic Value of Activity

Willingness to Pay: The Relevant Measure of Value

The economic value of marine recreational fishing in southern California is equivalent to the total amount that anglers are willing to pay to participate in the various fishing activities. Total willingness to pay includes actual (out-of-pocket) expenditures and consumer surplus. Both trip-related costs (e.g., boat fees, tackle rental, boat fuel, etc.) and expenditures on durable goods and related services (e.g., boats, slip fees, rods and reels, etc.) used for fishing comprise actual expenditures.

Table 12. Annual Demand for Marine Recreational Fishing Trips Estimated with Single Equation Model¹

Explanatory Variable	Boat Owners			Nonboat Owners		
	Party/Charter Boat 1 Day or Less	Party/Charter Boat Greater Than 1 Day	Shore	Party/Charter Boat 1 Day or Less	Party/Charter Boat Greater Than 1 Day	Shore
Constant	1.83	.967	2.085	1.95	1.77	1.801
Travel Cost ²	-.041 ₃ (-3.53)	-.0091 (-1.317)	-.0272 (-3.74)	-.0135 (-1.74)	-.0145 (-3.35)	-.0128 (-2.21)
Fish Caught	.0029 (.17)	.0078 (3.44)	.0485 (2.44)	.028 (1.49)	.054 (2.55)	.0882 (3.63)
R ²	.11	.17	.078	.04	.15	.074

¹ Dependent variable = natural log of quantity of trips demanded.

² Includes only transportation expenses.

³ t-statistics in parentheses.

Consumer surplus or net willingness to pay represents the monetary value of fishing above and beyond actual out-of-pocket expenditures. This surplus value can be expressed either on an average per trip basis or as a total annual amount for sport-fishing activity. For this study, both measures are estimated.

An additional measure of willingness to pay associated with marine recreational fishing is option value. This measure refers to the value that nonparticipants would be willing to pay to ensure future fishing opportunities. Although not estimated as part of this study, option value should be recognized as a component of economic value.

Benefit Estimation

Angler Expenditures. Expenditures incurred by marine recreational anglers are one component of benefits received or value associated with sportfishing. Angler outlays, including trip-related costs and expenditures on fishing-related durable goods and services, are described below.

Trip-related Costs. Trip costs incurred to sportfish include travel costs, food and beverage costs, and a variety of fishing-related costs. These costs can vary considerably across modes. Average per trip expenditures for marine recreational fishing by mode in southern California are estimated in Table 13. These estimates are based on results of the angler survey conducted as part of this study.

For party/charter and private/rental boat fishing modes, average per trip expenditures are presented by length of trip. The mean length of party/charter boat trips greater than 1 day was 4.13 days (Table 13); the mean length of private/rental boat trips greater than 12 hours was 22 hours. Based on NMFS studies, trips greater than 1 day in length are predominantly fishing trips into Mexican waters (Crooke pers. comm.). The breakdown in Table 13 of average trip expenditures by length of boat trip allows for a more precise estimation of the economic value of all fishing activity occurring in or originating from southern California marine waters.

Average expenditures on day trips were highest for private/rental boat, which represent primarily private boat trips (Table 13). Original survey estimates of average per trip expenditures for private boat anglers were considered overestimates for the typical private boat angler. The percentage of boat owners (52 percent) in the survey was higher than the percentage (30.3 percent) indicated in an NMFS survey (KCA Research 1983) of the general fishing population. In addition, the type of boat owned (i.e., powered and nonpowered, inboard and outboard) differed between the two survey groups.

Because these factors likely influence average per trip expenditures, the original estimates of boat fuel expenditures

Table 13. Average Expenditures Per Trip for Marine Recreational Fishing in Southern California (1983)

Expenditure Category	Man-made Structures	Party/Charter Boat		Private/Rental Boat	
		Trips 1 day or less	Trips greater than 1 day ¹	Trips 12 hours or less ²	Trips greater than 12 hours ³
	Beach/Bank				
- Boat fees	-	\$40.49	\$464.19	-	-
- Terminal tackle, bait, equipment rental, licenses, fish cleaning and processing	\$7.18	\$11.05	\$75.34	\$17.02	\$ 35.12
- Food, beverages, and lodging	\$6.89	\$10.68	\$34.00	\$15.02	\$ 44.38
- Boat fuel	-	-	-	\$35.63 ^{4,5}	\$113.98
- Gasoline and/or other transportation costs	\$7.22	\$10.08	\$26.96	\$11.09	\$ 17.80
TOTAL EXPENDITURES	\$21.29	\$72.30	\$600.49	\$78.76	\$211.28

¹ Mean number of days per trip is 4.13.

² Private/rental boat trips of 12 hours or less in duration are considered day trips.

³ Mean number of hours per trip is 22.

⁴ Adjusted to represent the relative percentage of boat owners and the type of boat associated with private boat fishing; refer to the text for additional information on the weighting methods.

⁵ Includes rental boat fees.

were weighted to reflect the relative percentage of boat owners and nonboat owners and the relative percentage of boats by type reported by NMFS. The estimates in Table 13 reflect these adjustments.

As shown in Table 13, average per trip expenditures (excluding multiple day trips) for a day of fishing varied considerably across modes. Fishing from man-made structures was the least costly at \$21.29 per trip, and fishing from private/rental boats was the most expensive at \$78.76. Expenditures on boat fuel were the largest single cost element for private/rental boat fishing, representing 45 percent of total average expenditures for day trips (i.e., 12 hours or less).

For party/charter boat trips of 1 day or less, boat fees represented 56 percent of total trip costs. The average trip cost for party/charter boat trips greater than 1 day in length was \$600.49. As previously indicated, the average duration of party/charter boat trips exceeding 1 day was 4.13 days, resulting in an average per day cost of \$145.39. For the shore fishing modes, average per trip expenditures were evenly distributed across the expenditure categories.

Based on the estimated number of trips (including trips into Mexican waters) by mode in 1983, total trip expenditures by marine recreational anglers in southern California are estimated in Table 14. The allocation among specific expenditure categories is based on the relative proportions of total mean trip expenditures identified in the NMFS Socioeconomic Survey (KCA Research 1983).

Durable Goods and Related Services. The second component of angler expenditures related to marine recreational fishing are outlays for durable goods and related services. The purchase of durable goods and related services are evaluated independent of trip costs because these expenditures in general are not incurred for specific trips. Expenditures on durable goods include boats, motors, trailers, rods and reels, and other fishing-related equipment (e.g., tackle boxes, boating accessories, etc.). Expenditures on related services include boat slip fees, insurance, maintenance, and repair costs for durable goods used for saltwater sportfishing.

A fundamental problem in estimating angler expenditures on durable goods and services is identifying expenditures attributable only to saltwater fishing activity. Boats are used for activities other than saltwater fishing (e.g., freshwater fishing, cruising, etc.). Similarly, some gear can be used for both saltwater and freshwater fishing. Because of these cross-over uses, estimating expenditures on durable items is difficult.

Two approaches were used to estimate expenditures by marine recreational anglers on durable goods and related services. The first method relies on data collected in this study's angler survey. Boat owners who participated in the survey were asked

Table 14. Estimated Total Trip Expenditures by Marine Recreational Anglers in Southern California in 1983

<u>Business Sector/Expenditure Category</u>	<u>Man-Made Structures</u>	<u>Beach/Bank</u>	<u>Party/Charter Boat</u>	<u>Private/Rental Boat</u>	<u>All Modes</u>
<u>Amusement and Recreation Services</u>					
- Boat Fee	-	-	\$58,042,500	\$ 5,101,300	\$63,143,800
- Licenses	\$2,195,100	\$1,747,400	3,522,100	6,422,900	13,887,500
- Fish Cleaning and Processing	129,100	54,600	1,835,700	366,100	2,385,500
Subtotal	<u>2,324,200</u>	<u>1,802,000</u>	<u>63,400,300</u>	<u>11,890,300</u>	<u>79,416,800</u>
<u>Retail Trade</u>					
- Terminal Tackle	3,042,500	4,446,600	2,716,200	16,186,800	26,392,100
- Bait	2,703,600	1,552,400	1,044,700	9,018,600	14,319,300
- Equipment Rental	-	-	5,805,500	1,414,100	7,219,600
- Gasoline	7,953,000	8,231,400	13,334,000	21,138,500	50,656,900
- Boat Fuel	-	-	-	65,474,000	65,474,000
Subtotal	<u>13,699,100</u>	<u>14,230,400</u>	<u>22,900,400</u>	<u>113,232,000</u>	<u>164,061,900</u>
<u>Eating and Drinking Places</u>					
- Food and Beverages	6,296,200	8,506,400	8,596,300	27,117,500	50,516,400
<u>Hotels and Lodging</u>					
- Lodging	1,448,200	1,384,800	5,135,800	2,551,500	10,520,300
<u>Local Government Passenger Transit</u>					
- Public Transportation	<u>162,300</u>	<u>168,000</u>	<u>257,400</u>	<u>431,400</u>	<u>1,019,100</u>
TOTAL TRIP EXPENDITURES	\$23,930,000	\$26,091,600	\$100,290,200	\$155,222,700	\$305,534,500

the dollar amount spent in 1983 on boat payments, boat maintenance and repairs, boat insurance, and slip rental. Average expenditures were developed for three types of boat owners: owners of one boat that was unpowered; owners of one boat powered by an inboard motor; and owners of one boat powered by an outboard motor.

The average boat expenditures by type were then weighted based on the proportion of boat owners by type reported by NMFS (KCA Research 1983). These weighted average expenditures were further adjusted to reflect the percentage of time reported by NMFS (KCA Research 1983) that boats were used for saltwater fishing. Powered boats were reported to be used 45 percent of the time for saltwater fishing; nonpowered boats were assumed to be used for saltwater fishing 25 percent of the time.

Based on these weighting procedures, average 1983 expenditures for saltwater fishing for the "typical" boat owner are as follows:

<u>Expenditure Category</u>	<u>Average 1983 Expenditures</u>
Boat payments	\$521.10
Boat maintenance	\$104.17
Boat repairs	\$108.80
Boat insurance	\$ 67.01
Slip rental	<u>\$ 85.79</u>
TOTAL EXPENDITURES	\$886.87

To estimate total expenditures on boats, motors, and related services, the percentage of boat owners in the general saltwater fishing population along the Pacific Coast, as reported by NMFS (KCA Research 1983), was used. Assuming that 30.3 percent of total participants from California were boat owners in 1983, total boat expenditures are estimated in Table 15.

A similar weighting method was used to estimate expenditures on durable gear and equipment (excluding boats and motors). Analysis of the survey data indicated that, on average, the population survey had higher household income and took more trips than the "typical" saltwater angler in southern California. Consequently, a sample of respondents was selected that was representative of the mean number of total saltwater trips taken (7.9 trips) and the mean income (\$15,000-35,000) of the typical saltwater angler as previously reported by NMFS (Thomson pers. comm. and KCA Research 1983). Based on this subsample of survey respondents, average expenditures on durable gear and equipment were estimated for boat owners (\$181.25) and nonboat owners (\$264.21). Total expenditures on durable gear and equipment were estimated by multiplying the average expenditures by the estimated number of total participants who were boat owners and nonboat owners. These estimates are presented in Table 15.

Angler expenditures on durable goods and related services also were estimated from survey data in the U. S. Fish and Wildlife Service's 1980 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation report for California. Expenditures on boats and related services were based on average statewide expenditures per sportsman for outboard boats, adjusted to 1983 dollars. These expenditures per sportsman were then multiplied by the estimated number of boat owners who participated in saltwater angling in southern California in 1983, and allocated among the boat expenditure categories in Table 15 based on the relative proportions identified in the southern California angler survey. Expenditures on durable fishing equipment were estimated from data on average statewide expenditures of saltwater anglers on fishing and auxiliary equipment, excluding terminal tackle. These expenditures were adjusted to 1983 dollars by the Consumer Price Index for California and multiplied by the estimated number of total participants. These estimates are also presented in Table 15.

As evident in Table 15, differences in total expenditures on durable goods and related services result from the two estimation methods. The most significant difference is estimated expenditures on durable fishing equipment. Annual variability (i.e., adjusted 1980 data vs. 1983 data) likely explains some of this difference. Other factors, however, probably include the lack of consistent definitions and the cross-over problem previously identified. An additional factor is that some upward bias likely exists in the data from the southern California angler survey even though procedures were followed to estimate average angler expenditures that were representative of the general fishing population.

Consumer Surplus

The net benefit of marine recreational fishing to the angler is known as consumer surplus. This is the monetary amount that the individual would be willing to pay, over and above current expenditures, to continue fishing participation; alternatively, it is the compensation required to induce the angler to cease fishing. In this study consumer surplus was measured in two ways--using the travel cost method with the demand functions previously estimated, and from responses to a contingent valuation survey contained in the questionnaire.

Travel Cost Method. The travel cost approach to estimating net benefits of fishing is based on the demand equations previously estimated. Travel costs, including time costs, are used as a surrogate for price to predict participation in each mode at successively higher prices. As derived in Appendix C, the area under the demand curve and above price is the angler's surplus.

To estimate annual surplus for the typical angler, the price associated with the mean number of trips taken is used. Information is currently not available, however, on the mean number of

Table 15. Estimated Expenditures on Durable Goods and Related Services by Marine Recreational Anglers in Southern California in 1983

Business Sector/Expenditure Category	USFWS Survey ¹		Southern California Angler Survey		Total Estimated Expenditures
	Estimated Expenditures ^{2,6}	Estimated Expenditures of Boat Owners ^{3,6} Nonpowered Boats ⁴	Estimated Expenditures ^{3,6} Nonboat Owners	Estimated Expenditures ^{3,6} Nonboat Owners	
Amusement and Recreation Services					
- Slip rental	\$26,338,800 ⁵	\$ 26,848,900 ⁶	-	-	\$ 29,868,400
Retail Trade					
- Durable fishing equipment	56,312,500 ⁷	63,101,600 ⁸		\$211,593,400	\$274,695,000
- Boats and motors	159,390,300 ⁵	162,674,000	-	-	181,422,700
Ship and Boat Building and Repair					
- Boat maintenance	32,040,900 ⁵	32,553,400	-	-	36,267,600
- Boat repairs	33,398,700 ⁵	33,932,800	-	-	37,880,300
Insurance					
- Boat insurance	20,365,300 ⁵	20,903,400	-	-	23,329,700
Total Expenditures on Durable Goods and Related Services	\$327,846,500	\$340,014,100	\$31,856,200	\$211,593,400	\$583,463,700

1 U. S. Fish and Wildlife Service, 1980 National Survey of Fishing, Hunting, and Wildlife—Associated Recreation, California.
2 Based on data in footnote 1 and adjusted to 1983 dollars by the Consumer Price Index for California.
3 Boat owners are assumed to represent 30.3% and nonboat owners 69.7% of total participants as reported in KCA Research (1983).
4 Owners of powered boats represent 84.9% and owners of nonpowered boats represent 15.1% of total boat owners who participate in marine recreational fishing on the Pacific Coast as reported in NMFS (1983).
5 Derived from data in footnote 1 on average statewide expenditures per sportsman for outboard boats and allocated among expenditure categories based on the relative proportions identified from the southern California angler survey.
6 Based on 1,149,000 state resident participants in 1983 as presented in Table 1.
7 Derived from data in footnote 1 on average statewide expenditures per saltwater angler on fishing and auxiliary equipment, excluding terminal tackle.
8 Includes expenditures by owners of nonpowered boats.

trips taken within each mode for the typical angler in the southern California saltwater fishing population. Alternatively, the average number of total saltwater trips for anglers intercepted in each mode, as developed by NMFS (Thomson pers. comm.), was used to approximate the average number of trips by mode. Consumer surplus per trip for the typical angler can be estimated by dividing annual surplus by the mean number of trips taken in each mode (equation C-2 in Appendix C).

Estimates of consumer surplus based on the fitted regression equations in Tables 10, 11, and 12 are presented in Table 16. As shown, annual consumer surplus for the "typical" angler (i.e., one who took the mean number of trips) on charter/party boat trips of 1 day or less ranges for boat owners from \$83, using the conventional demand model, to \$338 using the time demand model, and from \$181 to \$683 for nonboat owners. For party/charter boat trips greater than 1 day, annual consumer surplus for the "typical" angler ranges from \$190 to \$1,354 for boat owners, and from \$232 to \$2,156 for nonboat owners. The annual consumer surplus for the typical private boat angler ranges between \$853 and \$3,110 for boat owners, and is estimated at \$698 for nonboat owners. Shore anglers who owned a boat received between \$244 and \$1,239 in estimated annual surplus whereas nonboat owners received an estimated \$444.

The estimates of per trip consumer surplus in Table 16 are based on equation (C-2). As shown, consumer surplus of boat owners by mode ranges from \$22 per trip for charter/party fishing (less than 1 day) to \$74 per trip for private boat fishing, when estimated with the conventional demand model. Estimates of consumer surplus by mode for boat owners using the time demand model range from \$91 per trip for charter/party boat trips less than 1 day to \$366 per trip for charter/party boat trips greater than 1 day. Per trip estimates of consumer surplus for shore fishing are also presented in Table 16.

The estimates of consumer surplus presented in Table 16 are likely to differ because different variables were used to estimate the demand equations. Possibly, the omission of a travel time variable (because of measurement problems) in the conventional demand model tends to underestimate consumer surplus.

Contingent Valuation. In contingent valuation surveys, respondents typically are asked hypothetical questions about their valuation of recreation activities. Examples of such questions are: "What is the most that you would be willing to pay to avoid having the fishery shut down?" or "What is the most that you would be willing to pay for an annual license to fish?" Hanemann (1985), however, has argued that one is likely to obtain more reliable responses if individuals are asked hypothetical questions about their behavior rather than their valuation. This approach was followed in the present survey.

Table 16. Estimated Annual and Per Trip Consumer Surplus by Mode of Fishing

Mode of Fishing	Number of Trips ¹	Time Demand Model ²		Conventional Demand Model ³	
		Boat Owners Annual	Nonboat Owners Per Trip	Boat Owners Annual	Nonboat Owners Per Trip
Charter/Party Boat					
- Trips 1 day or less	3.7	\$ 338	\$ 91	\$ 83	\$181
- Trips greater than 1 day	3.7	1,354	366	190	232
Private Boat	11.4	3,110	272	853	698
Shore Fishing	7.15	1,239	173	244	444

* Not estimated because of insignificant coefficient.

¹ Estimate based on the average number of total saltwater trips for anglers intercepted in each mode (Thomson pers. comm.); information developed from intercept surveys conducted for the KCA Research (1983).

² Estimated from demand equations in Tables 10 and 11.

³ Estimated from demand equations in Table 12.

At the end of each of the modal participation sections of the questionnaire, respondents were asked: "If the cost of party/charter boat fishing (or whatever the mode) were increased by \$10 per trip, would you stop taking party charter boat trips altogether?" If the respondent answered "No," he was asked: "What if the cost increase was \$20/trip, or \$40/trip, or \$75/trip, etc.?" (Usually, four or five questions were repeated.)

As detailed in Appendix C, the information provided by the responses to these questions is sufficient to estimate an individual's demand function for each mode of fishing. Estimates of consumer surplus then are derived from these demand functions. These estimates are presented in Table 17.

For several reasons, caution must be used when comparing the estimates of consumer surplus from the contingent valuation survey with results from the modal demand equations. The values derived from the modal demand equations are based on observed behavior, whereas the values from the contingent valuation are based on responses to hypothetical questions. Also, different statistical techniques and functional forms were used to analyze the data. Both factors could result in different estimates of consumer surplus.

Estimate of Gross Economic Value

The gross economic value of marine recreational fishing is measured by the total willingness of anglers to pay to participate in the various sportfishing activities. As previously discussed, willingness to pay includes the amount that anglers would be willing to pay (i.e., consumer surplus) in addition to the amount that they currently pay (i.e., gross expenditures) to participate.

As presented in Table 18, the gross economic value of marine recreational fishing in southern California in 1983 is estimated at approximately \$953 million. This estimate includes approximately \$306 million in total trip expenditures, \$365 million in expenditures on durable goods and related services, and approximately \$282 million in consumer surplus.

A conservative approach was followed to estimate the components of gross economic value. Low estimates of expenditures on durable fishing equipment developed from USFWS survey data were used. Significant estimation differences resulting from the two sets of survey data (i.e., USFWS and Southern California Angler Survey) could not be sufficiently explained; consequently, use of the lower USFWS estimate was considered appropriate.

The calculation of consumer surplus in Table 18 also reflects conservative estimates. Average per trip estimates based on results from the conventional demand model (Table 16) were used to estimate total consumer surplus. Although the more

Table 17. Estimates of Consumer Surplus from Contingent Valuation Survey

<u>Mode of Fishing</u>	<u>Fishing Unit</u>	<u>Consumer Surplus Estimates</u>		
		<u>Mean Value</u>		<u>Median Value</u>
		<u>at 20%¹</u>	<u>at 50%²</u>	
Party/charter boat	Trip	\$58.34	\$61.26	\$22.50
Rental boat	Day	\$17.73	\$18.25	\$15.00
Shore	Day	\$11.92	\$12.24	\$7.50
Private boat	Day	\$53.15	\$54.00	\$30.00

¹An upper bound 20% above the maximum cost increase identified assumed for respondents indicating no cut-off price.

²An upper bound 50% above the maximum cost increase identified assumed for respondents indicating no cut-off price.

Note: The percentage of respondents indicating no cut-off price were as follows:

Party/charter boat	4.2%
Rental boat	7.7%
Shore	14.6%
Private boat	3.5%

Table 18. Estimated Gross Economic Value of Marine Recreational Fishing in Southern California in 1983

<u>Component of Economic Value</u>	<u>Total Estimated Value (thousands of dollars)</u>
<u>Gross Expenditures</u>	
Trip costs ¹	
- Man-made structures	\$ 23,930
- Beach/bank	26,092
- Party/charter boat	100,290
- Private/rental boat	155,223
Total Trip Costs	<u>\$305,535</u>
<u>Expenditures on durables</u>	
- Boats and related services ²	308,769
- Fishing equipment	56,312
Total Durable Expenditures	<u>\$365,081</u>
<u>Consumer Surplus⁴</u>	
	<u>Boat Owners⁵</u>
	<u>Nonboat Owners⁵</u>
Party/charter boat	
- Trips 1 day or less	\$11,383
- Trips more than 1 day	538
Private/rental boat	97,902
Shore fishing	23,785
Total Consumer Surplus	<u>\$133,608</u>
	\$34,868
	914
	38,503
	74,486
	<u>\$148,771</u>
	46,251
	1,452
	136,405
	98,271
	<u>\$282,379</u>
	<u>\$952,995</u>

GROSS ECONOMIC VALUE

¹Derived from Table 14.

²Derived from estimated expenditures in Table 15 based on data from the southern California angler survey.

³Derived from estimated expenditures in Table 15 based on data from the USFWS survey.

⁴Based on the estimated number of total trips by mode (Table 1) including trips into Mexican waters and on per trip estimates of consumer surplus in Table 16 using the conventional demand model.

⁵Based on the relative percentage of boat owners and nonboat owners who participated in each mode as determined in the southern California angler survey.

sophisticated time demand model provided the flexibility to consider individual circumstances in recreational decisions, data were insufficient to produce results that were statistically reliable for all modes of fishing. Consequently, the use of the lower estimates of consumer surplus provided by the conventional demand model was considered prudent until additional analysis can be conducted.

Economic Impacts

Expenditures by marine recreational anglers result in direct and indirect economic impacts. These impacts include the generation of retail sales, employment, wages and salaries, and sales tax revenues. Input-output analysis was used to estimate these impacts at the state level.

Direct Impacts

Retail Sales. As shown in Table 19, total retail sales associated with marine recreational fishing in southern California in 1983 are estimated between \$633.4 and \$889.0 million. The estimates of sales by business sectors were developed from estimates of total trip expenditures and total expenditures on durable goods and related services presented in Tables 14 and 15, respectively. The business sectors were selected to correspond with expenditure data collected.

Employment. As shown in Table 19, direct employment in California generated by marine recreational fishing activity in southern California in 1983 is estimated between 17,408 and 24,970 full-time equivalent jobs. These estimates were derived from U. S. Bureau of Labor Statistics data for 1980 on output per worker (Appendix D). The Consumer Price Index for California was used to adjust values to 1983 dollars.

Wages and Salaries. As shown in Table 19, direct wages and salaries in California generated by southern California marine fishing activity are estimated between \$200.1 and \$282.8 million in 1983. These estimates were derived from 1982 earnings to employment data published by the U. S. Bureau of the Census (1983) and adjusted to 1983 dollars by the Consumer Price Index for California (see Appendix D).

Sales Tax Revenues. Expenditures by marine recreational anglers also result in the generation of state tax revenues. The most important tax in terms of revenue generation is the sales tax. Estimates of sales tax revenues generated from expenditures by marine recreational anglers in southern California are presented in Table 20. As shown, total sales tax revenues are estimated between \$27.9 and \$42.0 million.

It should be recognized that sales tax revenues can only be approximated because of data limitations. In California, food

Table 19. Estimate of Direct Impact on Retail Sales, Employment, and Wages and Salaries in California from Marine Recreational Fishing in Southern California (1983)

<u>Business Sector</u>	<u>Retail Sales</u> (000s)	<u>Output</u> <u>Per Worker (\$)</u> ²	<u>Direct</u> <u>Employment</u> <u>Impact</u> (full-time equivalent jobs)	<u>Earnings to</u> <u>Employment</u> <u>Ratio</u>	<u>Wage and</u> <u>Salary Impact</u> (000s)
Amusement and Recreation Services	\$105,756-109,284	46,300	2,284-2,360	13,200	\$30,148-31,152
Retail Trade	379,765-620,178	32,947	11,526-18,823	10,600	122,175-199,523
Eating and Drinking Places	50,516	30,382	1,662	6,400	10,636
Hotels and Lodging	10,520	20,408	515	8,800	4,532
Local Government, Passenger Transit	1,019	32,837	31	11,800	365
Ship and Boat Building and Repair	65,440-74,147	60,518	1,081-1,225	24,100	26,052-29,522
Insurance	<u>20,365-23,329</u>	65,743	<u>309-354</u>	20,100	<u>6,210-7,115</u>
TOTAL IMPACT	\$633,381-888,993		17,408-24,970		\$200,118-282,845

¹ Derived from Tables 14 and 15.

² Based on 1980 data published by the U. S. Bureau of Labor Statistics for identified business sectors; information adjusted to 1983 dollars by the Consumer Price Index for California.

³ Based on 1982 data from County Business Patterns, published by the U. S. Bureau of the Census (1983); information adjusted to 1983 dollars by the Consumer Price Index for California.

Table 20. Estimated State Sales Tax Generated from Expenditures by Marine Recreational Anglers in Southern California in 1983 (thousands of dollars)

<u>Expenditure Category</u>	<u>Total Sales</u> ¹	<u>% of Sales Subject to Tax</u>	<u>Sales Tax Impact</u> ³
Amusement and Recreation Services	\$105,756-\$109,284	0	-
Retail Trade	379,765-620,178	100	\$21,497-\$35,105
Eating and Drinking Places	50,516	75 ²	2,145
Hotels and Lodging	10,520	100	596
Local Government Passenger Transit	1,019	0	-
Ship and Boat Building and Repair	65,440-74,147	100	3,705-4,197
Insurance	<u>20,365-23,329</u>	0	-
TOTAL IMPACT	\$633,381-\$888,993		\$27,943-\$42,043

¹Derived from Tables 14 and 15.

²Assumed expenditures at restaurants and fast food outlets.

³Derived by dividing the portion of total sales subject to sales tax by 1.06.

purchases in grocery stores are exempt from the 6 percent sales tax. Because the location of food expenditures by marine recreational anglers was not known, certain simplifying assumptions were made.

Food expenditures on fishing trips are assumed to occur primarily at restaurants or fast food outlets where food sales are taxable. As an approximation, 75 percent of total food expenditures is assumed to occur at these establishments and to be subject to the 6 percent sales tax. Based on this assumption, food expenditures are estimated to generate \$2.1 million in sales tax revenues in 1983.

Indirect and Induced Impacts

In addition to direct economic impacts, multiplier or "ripple" effects associated with expenditures of marine recreational anglers occur throughout many other sectors of the economy. These effects include indirect and induced impacts. Indirect impacts are the economic effects on industries that supply goods and services to the directly-impacted business sectors. Employment and wage and salary effects generated by the supply of raw materials to manufacturers of fishing tackle are an example of indirect impacts. Induced impacts are additional impacts generated throughout the economy from spending of income earned at the direct and indirect levels.

As shown in Table 21, expenditures by saltwater anglers in southern California in 1983 are estimated to have generated between \$1.2 and \$1.7 billion in direct and indirect gross economic output and between \$2.1 and \$2.9 billion in direct, indirect, and induced gross economic output. Total gross output was estimated for the selected business sectors with the use of gross output multipliers for California. Total gross output was then disaggregated among industry sectors based on an 8-sector and a 9-sector model developed for the Southern California Association of Governments region (see Appendix D for input data).

Indirect and induced employment and wage and salary impacts also are estimated in Tables 21 and 22. Total direct and indirect employment resulting from expenditures by anglers in southern California in 1983 is estimated between 27,485 and 39,280 full-time equivalent jobs. Total direct, indirect, and induced employment is estimated between 30,022 and 42,508 jobs. Direct and indirect wage and salary impacts are estimated between \$498.1 and \$697.7 million, and direct, indirect, and induced wage and salary impacts are estimated between \$567.4 and \$792.9 million.

Table 21. Estimated Direct and Indirect Gross Output, Employment, and Wage and Salary Impacts at the State Level of Angler Expenditures in Southern California (1983)

Business Sector	Indirect Gross Output by Aggregated Sectors							Total Industry Output	
	Farming	Ag Services	Mining	Manufacturing	Trade	Services	Government		Other
Amusement & Recreation Services									
- Gross Output, Low	\$1,247,921	\$179,785	\$317,268	\$22,547,179	\$5,287,800	\$169,209,600	\$1,068,136	\$21,214,654	\$221,072,342
- Gross Output, High	\$1,289,551	\$185,783	\$337,852	\$23,299,349	\$5,464,200	\$174,854,400	\$1,103,768	\$21,922,370	\$228,447,274
- Employment, Low	23.9	6.4	0.5	203.4	15.1	4,111.0	29.8	165.1	4,695.1
- Employment, High	24.6	6.6	0.6	210.2	16.0	4,248.2	30.8	170.6	4,851.8
- Wage and Salary, Low	\$661,832	\$75,060	\$19,280	\$5,231,212	\$2,481,294	\$80,026,613	\$551,373	\$4,406,856	\$93,453,522
- Wage and Salary, High	\$683,911	\$77,564	\$19,923	\$5,405,725	\$2,564,070	\$82,696,286	\$569,767	\$4,553,868	\$96,571,113
Retail Trade									
- Gross Output, Low	\$949,413	\$379,765	\$645,601	\$36,799,229	\$543,291,809	\$44,470,482	\$3,190,026	\$64,598,027	\$694,334,350
- Gross Output, High	\$1,550,445	\$620,178	\$1,054,303	\$60,095,248	\$887,226,647	\$72,622,844	\$5,209,495	\$105,492,278	\$1,133,871,437
- Employment, Low	18.1	13.5	1.1	332.0	15,932.3	1,080.4	88.9	502.6	17,969.0
- Employment, High	29.6	22.1	1.8	542.2	26,018.4	1,764.4	145.2	820.8	29,344.4
- Wage and Salary, Low	\$503,519	\$158,552	\$39,233	\$8,537,857	\$254,939,100	\$21,032,034	\$1,646,695	\$13,418,753	\$300,275,742
- Wage and Salary, High	\$822,275	\$258,924	\$64,070	\$13,942,809	\$416,330,154	\$34,346,516	\$2,689,147	\$21,913,592	\$490,367,488
Eating and Drinking Places									
- Gross Output	\$626,398	\$90,929	\$161,651	\$11,335,790	\$2,662,193	\$85,084,099	\$540,521	\$10,663,928	\$111,165,510
- Employment	12.0	3.2	0.3	102.3	78.1	2,067.2	15.1	83.0	2,361.0
- Wage and Salary	\$332,209	\$37,963	\$9,823	\$2,630,038	\$1,249,231	\$40,239,988	\$279,018	\$2,215,185	\$46,993,455
Hotels and Lodging									
- Gross Output	\$126,240	\$17,884	\$32,612	\$2,274,424	\$534,416	\$17,075,012	\$108,356	\$2,139,768	\$22,308,712
- Employment	2.4	0.6	0.1	20.5	15.7	414.8	3.0	16.6	473.8
- Wage and Salary	\$66,951	\$7,467	\$1,982	\$527,693	\$250,774	\$8,075,519	\$55,933	\$444,488	\$9,430,807
Local Gov't Transit									
- Gross Output	\$3,872	\$713	\$3,363	\$192,693	\$40,352	\$103,123	\$1,765,316	\$228,256	\$2,337,688
- Employment	0.1	0.0	0.0	1.7	1.2	2.5	49.2	1.8	56.5
- Wage and Salary	\$2,054	\$298	\$204	\$44,707	\$18,935	\$48,771	\$911,258	\$47,415	\$1,073,642
Ship and Boat Building									
- Gross Output, Low	\$2,002,464	\$104,704	\$1,308,800	\$117,386,272	\$4,142,352	\$6,509,440	\$373,008	\$8,644,624	\$140,571,664
- Gross Output, High	\$2,268,898	\$118,635	\$1,482,940	\$133,004,889	\$4,693,505	\$7,488,847	\$422,638	\$9,794,819	\$159,275,171
- Employment, Low	38.3	3.7	2.2	1,059.1	121.5	160.6	10.4	67.3	1,463.0
- Employment, High	43.4	4.2	2.5	1,200.0	137.6	181.9	11.8	76.2	1,657.6
- Wage and Salary, Low	\$1,062,003	\$43,714	\$79,535	\$27,235,005	\$1,943,794	\$3,125,893	\$192,547	\$1,795,722	\$35,478,213
- Wage and Salary, High	\$1,203,306	\$49,530	\$90,118	\$30,858,709	\$2,202,422	\$3,541,803	\$218,166	\$2,034,648	\$40,198,702
Insurance									
- Gross Output, Low	\$132,373	\$32,584	\$158,847	\$5,205,294	\$1,364,455	\$2,895,903	\$152,738	\$38,726,084	\$48,668,277
- Gross Output, High	\$151,639	\$37,326	\$181,966	\$5,962,892	\$1,563,043	\$3,317,384	\$174,968	\$44,362,426	\$55,751,644
- Employment, Low	2.5	1.2	0.3	47.0	40.0	70.4	4.3	301.3	466.8
- Employment, High	2.9	1.3	0.3	53.8	45.8	80.6	4.9	345.2	534.8
- Wage and Salary, Low	\$70,203	\$13,604	\$9,653	\$1,207,690	\$640,269	\$1,369,599	\$78,843	\$8,044,452	\$11,434,314
- Wage and Salary, High	\$80,421	\$15,584	\$11,058	\$1,383,462	\$733,456	\$1,568,936	\$90,318	\$9,215,273	\$13,098,508
TOTAL IMPACT									
- Gross Output, Low	\$5,088,680	\$806,364	\$2,628,141	\$195,740,881	\$557,323,378	\$325,447,658	\$7,198,100	\$146,215,340	\$1,240,448,542
- Gross Output, High	\$6,017,044	\$1,071,449	\$3,244,687	\$236,165,285	\$902,188,357	\$360,545,708	\$9,325,062	\$194,603,845	\$1,713,157,435
- Employment, Low	97.3	28.7	5.5	1,766.0	16,343.8	7,906.9	200.7	1,137.6	27,485.3
- Employment, High	115.0	38.1	5.5	2,130.7	26,457.0	8,759.6	260.0	1,514.1	39,280.0
- Wage and Salary, Low	\$2,698,772	\$336,657	\$159,711	\$45,414,202	\$261,523,398	\$153,918,417	\$3,715,667	\$30,372,871	\$498,139,695
- Wage and Salary, High	\$3,191,127	\$447,330	\$197,178	\$54,793,142	\$423,349,043	\$170,517,819	\$4,813,608	\$40,424,469	\$697,733,716

Table 22. Estimated Direct, Indirect, and Induced Gross Output, Employment, and Wage and Salary Impacts at the State Level of Angler Expenditures in Southern California (1983)

Business Sector	Farming	Ag Services	Mining	Induced Gross Output by Aggregated Sectors	Government	Other	Households	Total Industry Output
				Trade				
Amusement & Recreation Services								
- Gross Output, Low	\$2,719,023	\$261,832	\$684,791	\$49,174,038	\$25,256,704	\$145,566,445	\$1,530,709	\$361,368,252
- Gross Output, High	\$2,809,729	\$270,567	\$707,636	\$50,814,474	\$26,099,263	\$150,424,581	\$1,581,774	\$373,423,428
- Employment, Low	52.0	3.3	1.2	443.6	740.7	3,536.6	42.7	5,125.8
- Employment, High	53.7	3.6	1.2	458.4	765.4	3,654.6	44.1	5,296.8
- Wage and Salary, Low	\$1,442,029	\$109,315	\$41,615	\$11,408,959	\$11,851,681	\$68,845,678	\$790,154	\$102,490,969
- Wage and Salary, High	\$1,490,134	\$112,962	\$43,003	\$11,789,560	\$12,247,051	\$71,142,357	\$816,513	\$105,910,048
Retail Trade								
- Gross Output, Low	\$7,033,015	\$732,606	\$1,978,036	\$139,121,834	\$447,072,666	\$129,671,220	\$4,871,828	\$1,211,070,585
- Gross Output, High	\$11,485,317	\$1,196,387	\$3,230,245	\$227,193,925	\$730,095,275	\$211,760,530	\$7,955,975	\$1,977,747,642
- Employment, Low	134.4	26.1	2.4	1,255.2	13,110.6	3,150.4	135.8	16,791.4
- Employment, High	219.5	42.5	3.5	2,049.7	21,410.4	5,144.8	221.8	30,687.4
- Wage and Salary, Low	\$3,729,946	\$305,863	\$120,205	\$32,277,912	\$209,788,370	\$61,327,186	\$2,514,843	\$336,110,271
- Wage and Salary, High	\$6,091,215	\$499,492	\$196,301	\$52,711,680	\$342,596,426	\$100,150,807	\$4,106,883	\$548,887,327
Eating and Drinking Places								
- Gross Output	\$1,305,625	\$125,727	\$328,824	\$23,612,478	\$12,127,810	\$69,899,319	\$735,019	\$73,522,460
- Employment	25.0	4.5	0.6	213.0	355.7	1,698.2	20.5	2,461.3
- Wage and Salary	\$692,436	\$52,491	\$19,983	\$5,478,375	\$5,690,962	\$33,058,442	\$379,418	\$49,214,298
Hotels and Lodging								
- Gross Output	\$269,840	\$25,985	\$67,960	\$4,880,099	\$2,506,510	\$14,446,412	\$151,910	\$35,862,680
- Employment	5.2	0.9	0.1	44.0	73.5	351.0	4.2	508.7
- Wage and Salary	\$143,109	\$10,849	\$4,130	\$1,132,241	\$1,176,177	\$6,832,339	\$78,416	\$10,171,344
Local Gov't Transit								
- Gross Output	\$27,336	\$2,286	\$8,052	\$557,858	\$310,937	\$449,109	\$1,005,973	\$4,111,665
- Employment	0.5	0.1	0.0	5.0	9.1	10.9	28.0	57.2
- Wage and Salary	\$14,498	\$955	\$489	\$129,430	\$145,907	\$212,403	\$519,284	\$1,116,051
Ship and Boat Building								
- Gross Output, Low	\$2,719,025	\$173,851	\$1,321,265	\$113,406,272	\$35,703,573	\$23,428,117	\$785,805	\$240,950,080
- Gross Output, High	\$3,080,799	\$196,982	\$1,497,064	\$128,495,336	\$18,926,036	\$26,545,302	\$890,359	\$273,009,254
- Employment, Low	52.0	6.2	2.2	1,023.2	489.8	569.2	21.9	2,333.3
- Employment, High	58.9	7.0	2.5	1,159.3	555.0	644.9	24.8	2,643.7
- Wage and Salary, Low	\$1,442,029	\$125,583	\$80,293	\$26,311,598	\$7,836,134	\$11,080,180	\$405,633	\$51,737,411
- Wage and Salary, High	\$1,633,896	\$82,240	\$90,976	\$29,812,439	\$8,881,022	\$12,554,433	\$459,604	\$58,621,238
Insurance								
- Gross Output, Low	\$476,849	\$54,423	\$217,692	\$10,793,902	\$5,377,514	\$8,111,624	\$377,298	\$79,973,355
- Gross Output, High	\$546,252	\$62,344	\$249,376	\$12,364,888	\$6,160,178	\$9,292,221	\$317,657	\$91,612,983
- Employment, Low	9.1	1.9	0.4	97.4	157.7	197.1	7.7	273.9
- Employment, High	10.4	2.2	0.4	111.6	180.7	225.8	8.9	313.8
- Wage and Salary, Low	\$252,896	\$22,722	\$13,229	\$2,504,313	\$2,523,393	\$3,836,341	\$143,142	\$853.7
- Wage and Salary, High	\$289,704	\$26,029	\$15,154	\$2,868,800	\$2,890,657	\$4,394,697	\$163,975	\$16,026,773
TOTAL IMPACT								
- Gross Output, Low	\$14,550,714	\$1,376,709	\$4,606,619	\$341,546,480	\$509,355,714	\$391,574,245	\$9,358,542	\$2,106,859,077
- Gross Output, High	\$19,524,899	\$1,880,277	\$6,089,156	\$447,919,058	\$796,226,009	\$482,817,474	\$12,638,666	\$2,929,290,112
- Employment, Low	278.1	49.0	7.8	3,081.4	14,937.1	9,513.5	260.9	30,022.9
- Employment, High	373.2	66.9	10.3	4,041.1	23,349.7	11,730.3	352.3	42,508.8
- Wage and Salary, Low	\$7,716,943	\$574,776	\$279,943	\$79,242,827	\$239,016,624	\$185,192,570	\$4,830,890	\$567,449,724
- Wage and Salary, High	\$10,354,992	\$785,016	\$370,036	\$103,922,524	\$373,628,202	\$228,345,479	\$6,524,094	\$792,947,079

CONCLUSIONS

Marine recreational fishing in southern California generates substantial economic value to participants and the State economy. In 1983, over 1.4 million anglers spent an estimated \$670 million on fishing-related goods and services, and received additional value estimated at \$282 million. Direct economic activity generated by angler expenditures included an estimated 17,400 to 24,900 jobs, between \$200 and \$282 million in wages and salaries, and between \$27.9 and \$42.0 million in sales tax revenues. Angler expenditures also generated significant indirect and induced economic effects.

Two important applications of the research findings are to evaluate the economic consequences of fishery management plans and policies, and to analyze angler characteristics and factors important to estimating future changes in the angling population. The estimates of gross and net economic benefits provide a benchmark to assess potential losses and gains in economic value associated with projected changes in fishing participation by mode of activity.

The analysis of factors related to the participation and trip intensity decision of anglers provides considerable insight into sportfishing motivation. As expected, boat ownership influences not only the mode of participation, but also the number of trips taken. The number of fish caught also was an important factor influencing the number of trips taken. Participation in camping was a strong complementary activity with all modes of saltwater fishing whereas participation in hunting was complementary only with private boat fishing. Readership of spectator sport magazines also is generally complementary with participation in sportfishing.

This study provides a comprehensive description of the economic importance of saltwater fishing activity in southern California. Several important research issues remain, however. Preliminary analysis in this study suggests that the angler's modal participation decision is independent of the decision to participate in other modes. Formal testing of this hypothesis using the estimation procedures of Caswell and McConnell (1980) remains. Additional analysis also is needed on the cross-price effects of modes in which anglers did not participate. The relationship between economic value and the catch of certain species is an additional area of important research. Work is currently proceeding in each of these research areas.

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APPENDIX A

Survey Instrument and Follow-Up Reminder Card

Recently a questionnaire seeking information about your 1983 saltwater sportfishing activities in Southern California was mailed to you. Your name was selected from a random sample of subscribers to South Coast Sportfishing.

If you have already completed and returned the survey, please accept our sincere thanks. If not, please do so today. Because the questionnaire was sent to only a small sample of Southern California anglers, it is extremely important that yours also be included in the study.

If by some chance you did not receive the questionnaire, or it got misplaced, please call me immediately (619/233-1337) and I will send another one to you today.

Sincerely,

A handwritten signature in cursive script that reads "Carl E. Nettleton". The signature is written in black ink and is positioned to the right of the word "Sincerely,".

Carl E. Nettleton
Executive Director
National Coalition for Marine Conservation —
Pacific Region



Dear Fellow Saltwater Angler:

The National Coalition for Marine Conservation-Pacific Region is conducting a study on saltwater sportfishing in Southern California. The purpose of the study is to collect information on sportfishing activity to better understand the importance of the Southern California fishery to you, the angler.

As described in the April issue of South Coast Sportfishing, a select number of subscribers have been randomly chosen to participate in this survey. The survey asks about your 1983 saltwater sportfishing activities of all types, including fishing from party and charter boats, rental boats, private boats, and shore fishing. We are interested in fishing which occurred in or trips that originated from Southern California marine waters between Pt. Conception and the Mexican border. In addition, to better understand who participates in marine recreational fishing, we have asked some questions about some of your other activities. Most anglers can complete the questionnaire in about 30 minutes. All responses will be strictly confidential and will be used in combination with other questionnaires so that anonymity is ensured.

In return for your participation, 8 prizes including 2 full-day passes at H&M Landing in San Diego, 3 Daiwa 30H Sealine reels matched with Daiwa graphite livebait rods, and 3 off-shore fishing trips skippered by noted anglers Ken Schilling, Lowrance pro-staffer Gus Skinner, or Ed Pitts and Joe Ainge aboard the Tres Amigos, will be given away to randomly-selected respondents. Questionnaires must be completed and returned by June 21 to qualify for the prize drawing which will be held on June 28. For your convenience, a prepaid envelope is enclosed to return your completed questionnaire.

Your help is important to the Coalition's continuing effort to protect marine resources for saltwater sportfishermen and to improve saltwater fishing opportunities.



Sincerely,

Carl E. Nettleton
Executive Director
National Coalition for Marine
Conservation — Pacific Region

INSTRUCTIONS

This questionnaire has seven sections:

- I. 1983 Saltwater Fishing
- II. Saltwater Party (open boat) and Charter Boat Fishing
- III. Saltwater Rental Boat Fishing
- IV. Saltwater Shore Fishing
- V. Saltwater Private Boat Fishing
- VI. Other Activities
- VII. Demographic Characteristics

Sections I, VI, and VII should be completed *by all respondents*. Sections II, III, IV, and V should be completed if you participated in that type of saltwater fishing activity in Southern California during 1983.

Instructions for Estimating the Information Requested

Most of our questions ask about your 1983 fishing activity. What we are looking for is your best recollection of last year's activities. If, for example, you can't recall precisely "how much did you spend on boat fees for this charter boat trip?" your best estimate of the number is needed. If the answer is zero, please write "0" in the corresponding box.

Instructions for Describing a Typical Trip

For certain types of fishing, we have asked you to describe the typical trip. What we mean is the type of fishing trip which you usually do. If you fished at one site more than half of the time, this would be considered the typical trip. For example:

"For the typical trip to a beach/bank fishing site:

What was the typical one-way distance in MILES from your residence to the fishing site?

What was the typical time spent fishing in HOURS?

For Jim Bass who in 1983 made 6 trips to a beach site in Newport Beach and another 2 trips to Huntington Beach, the "typical trip" would be the 6 trips to Newport Beach. Since Jim lived 14 miles from the site and since he usually spent about 3 hours fishing, he would write 14 in the first box and 3 in the second box.



I. 1983 SALTWATER FISHING

1. Did you own a boat in 1983? Yes No
If NO, skip to Question 6. Otherwise please continue. [] []
2. Did you own more than one boat in 1983? [] []
3. Was your boat(s) powered? Boat 1 Boat 2
[] []
4. What percent of the time was your boat(s) used for:
- | | | |
|--------------------|---------|---------|
| Saltwater fishing | _____ % | _____ % |
| Freshwater fishing | _____ % | _____ % |
| Cruising | _____ % | _____ % |
| Other | _____ % | _____ % |
5. How much did you spend in 1983 on:
- | | | |
|------------------|----------|----------|
| Boat payments | \$ _____ | \$ _____ |
| Boat maintenance | \$ _____ | \$ _____ |
| Boat repairs | \$ _____ | \$ _____ |
| Boat insurance | \$ _____ | \$ _____ |
| Slip rental | \$ _____ | \$ _____ |
6. Check the following types of fishing equipment and gear that you owned in 1983?
- | | | | |
|---|--|--|---|
| <input type="checkbox"/> Outboard motors(s) | <input type="checkbox"/> Boat electronic equipment | <input type="checkbox"/> Spinning gear | <input type="checkbox"/> Trolling gear |
| <input type="checkbox"/> Boat trailer | <input type="checkbox"/> Outriggers, chairs, and harnesses | <input type="checkbox"/> Bait-casting gear | <input type="checkbox"/> Fly-fishing gear |
7. How much did you spend in 1983 for purchases of or repairs on:
- Durable gear and equipment (excluding boats, motors, and trailers) used for saltwater fishing (e.g. rod, reels, tackle boxes, etc.)? \$ _____
 - Terminal tackle used for saltwater fishing (e.g., hooks, lines, sinkers, etc.)? \$ _____
- The following question and directions pertain to your 1983 saltwater fishing which occurred in or originated from marine waters between Pt. Conception and the Mexican border. If in 1983 you did not fish or if none of your fishing activity took place in this area, please turn immediately to Section VI and Section VII.
8. In 1983, did you do any:
- | | | |
|--|--------|------------------------------|
| Charter/Party Boat Fishing? _____ | If Yes | _____ → Complete Section II |
| Rental Boat Fishing? _____ | If Yes | _____ → Complete Section III |
| Shore Fishing (beach, bank, pier, jetty, or other manmade structures)? _____ | If Yes | _____ → Complete Section IV |
| Private Boat Fishing? _____ | If Yes | _____ → Complete Section V |



II. SALTWATER PARTY (OPEN BOAT)/CHARTER BOAT FISHING

Complete this section only if you fished from a party/charter boat in 1983.

1. How many party/charter boat trips did you take during 1983? _____ trips

Please answer the following questions for each trip. If more than 5 trips were taken, describe only the last 5 trips.

2. What landing did you depart from? (please specify location and, if possible, name of landing)

Trip 1 _____

Trip 2 _____

Trip 3 _____

Trip 4 _____

Trip 5 _____

3. During which season did you take this party/charter boat trip? (please indicate:)

"S" for Summer/Fall season

(i.e. April thru October)

"W" for Winter/Spring season

(i.e. Jan. Feb., March, Nov., Dec.)

"D" for Don't Know

Trip 1	Trip 2	Trip 3	Trip 4	Trip 5

4. What was the approximate one-way distance in MILES from your residence to the dock site? (e.g., 5 miles, 100 miles, etc.)

--	--	--	--	--

5. What was the travel time from your residence to the dock site? (e.g., 30 min., 1½ hrs. etc.)

--	--	--	--	--

6. Was this party/charter boat trip part of a longer trip or vacation? (please write in "yes" or "no")

--	--	--	--	--

7. What was the length of boat trip in days? (e.g., ½-day, ¾-day, 1-day, etc.)

--	--	--	--	--

8. Did you fish for a principal species? (write in "yes" or "no")

--	--	--	--	--

If NO principal species were sought on any trip, SKIP to Question 11.

(continued on other side)



9. What was the principal species sought?(please indicate:)

"A" for ALBACORE/TUNA
 "B" for BILLFISH
 "C" for BONITO, YELLOWTAIL, BARRACUDA,
 or BASS
 "D" for BOTTOMFISH (e.g., ROCKFISH,
 HALIBUT, etc.)
 "E" for OTHER SPECIES (please write species on
 line below box)

Trip 1	Trip 2	Trip 3	Trip 4	Trip 5

10. How many fish of your principal species did you catch?

--	--	--	--	--

11. What was the total number of fish you caught of ALL SPECIES?

--	--	--	--	--

12. How much did you spend for yourself on:

- Boat fees

\$	\$	\$	\$	\$
----	----	----	----	----

- Terminal tackle, bait, equipment rental, licenses, fish cleaning and processing

\$	\$	\$	\$	\$
----	----	----	----	----

- Food, beverages, lodging

\$	\$	\$	\$	\$
----	----	----	----	----

- Gasoline and/or other transportation costs

\$	\$	\$	\$	\$
----	----	----	----	----

13. If the cost of boat fees for party/charter boat fishing increased by \$10 per trip would you stop taking party/charter boat trips altogether?

Yes ___ No ___

↓
 If the cost increase was: \$20/person/trip?

Yes ___ No ___

↓
 If the cost increase was: \$40/person/trip?

Yes ___ No ___

↓
 If the cost increase was: \$75/person/trip?

Yes ___ No ___

↓
 If the cost increase was: \$100/person/trip?

Yes ___ No ___

↓
 If the cost increase was: \$200/person/trip?

Yes ___ No ___

↓
 If the cost increase was: \$400/person/trip? Yes ___ No ___

III. SALTWATER RENTAL BOAT FISHING

Complete this section only if you fished from a rental boat in 1983.

1. How many rental boat trips did you take during 1983? _____ trips

Please answer the following questions for each trip. If more than 5 trips were taken, describe only the last 5 trips.

2. Where did you rent the boat? (please specify the location and, if possible, the name of landing)

Trip 1 _____

Trip 2 _____

Trip 3 _____

Trip 4 _____

Trip 5 _____

3. During which season did you take this rental boat trip? (please indicate:)

"S" for Summer/Fall season

(i.e., April thru October)

"W" for Winter/Spring season

(i.e., Jan., Feb., March, Nov., Dec.)

"D" for Don't Know

Trip 1	Trip 2	Trip 3	Trip 4	Trip 5

4. What was the approximate one-way distance in MILES from your residence to the rental boat site? (e.g., 5 miles, 100 miles, etc.)

--	--	--	--	--

5. What was the travel time from your residence to the rental boat site? (e.g., 30 min. 1½ hrs., etc.)

--	--	--	--	--

6. Was this particular rental boat trip part of a longer trip or vacation? (please write in "yes" or "no")

--	--	--	--	--

7. For how many hours did you rent the boat?

--	--	--	--	--

8. Did you fish for a principal species? (write in "yes" or "no")

--	--	--	--	--

If NO principal species were sought on any trip, SKIP to Question 11.

(continued on other side)



9. What was the principal species sought?
(please indicate:)

"A" for SANDBASS, HALIBUT, or CROCKER

"B" for BONITO, YELLOWTAIL, BARRACUDA,
or BASS

"C" for ROCKFISH

"D" for OTHER SPECIES (please write in species on
line below box)

Trip 1	Trip 2	Trip 3	Trip 4	Trip 5

10. How many fish of your principal species did you catch?

--	--	--	--	--

11. What was the total number of fish you caught of ALL SPECIES?

--	--	--	--	--

12. How much did you spend for yourself on:

• Boat fees and fuel

\$	\$	\$	\$	\$
----	----	----	----	----

• Terminal tackle, bait, equipment rental, licenses,
fish cleaning and processing

\$	\$	\$	\$	\$
----	----	----	----	----

• Food, beverages, lodging

\$	\$	\$	\$	\$
----	----	----	----	----

• Gasoline and/or other transportation costs

\$	\$	\$	\$	\$
----	----	----	----	----

13. If the cost to you for boat fees and fuel for rental boat fishing increased by \$2 per day, would you stop taking rental boat trips altogether?

Yes ___ No ___



If your cost increase was: \$5/day?

Yes ___ No ___



If your cost increase was: \$10/day?

Yes ___ No ___



If your cost increase was: \$20/day?

Yes ___ No ___



If your cost increase was: \$40/day?

Yes ___ No ___

IV. SALTWATER SHORE FISHING

Complete this section only if you fished from the beach, bank, pier, jetty, or other man-made structures in 1983.

1. How many trips were made to a beach or bank fishing site in 1983? _____ trips

If ZERO, skip to Question 8.

2. Of these trips, how many were made to a site:

Within 50 miles of your residence? _____ trips

Over 50 miles from your residence? _____ trips

For the typical trip:	
Within 50 Miles of Your Residence	Over 50 Miles from Your Residence

3. What was the typical one-way distance in MILES?

4. What was the typical time spent travelling? (e.g., 30 min., 1½ hrs., etc.)

5. What was the typical time spent fishing in HOURS?

6. What was the typical number of fish caught?

7. What was the typical dollar amount spent for yourself on:

• Terminal tackle, bait, licenses, fish cleaning and processing \$ \$

• Food, beverages, lodging \$ \$

• Gasoline and/or other transportation costs \$ \$

8. How many trips were made to a pier, jetty, or other man-made site in 1983? _____ trips

If ZERO, skip to Question 15.

9. Of these trips to a pier, jetty, or other man-made structure, how many were made to a site:

Within 50 miles of your residence? _____ trips

Over 50 miles from your residence? _____ trips

(continued on other side)



For the typical trip:	
Within 50 Miles of Your Residence	Over 50 Miles from Your Residence

10. What was the typical one-way distance in MILES?

--	--

11. What was the typical time spent travelling? (e.g., 30 min., 1½ hrs., etc.)

--	--

12. What was the typical time spent fishing in HOURS?

--	--

13. What was the typical number of fish caught?

--	--

14. What was the typical dollar amount spent for yourself on:

• Terminal tackle, bait, licenses, fish cleaning and processing

\$	\$
----	----

• Food, beverages, lodging

\$	\$
----	----

• Gasoline and/or other transportation costs

\$	\$
----	----

15. If your bait and transportation costs for shore fishing increased by \$1 per day, would you stop fishing at the shore altogether?

Yes___ No___

↓
If your cost increase was: \$2.50/day?

Yes___ No___

↓
If your cost increase was: \$5/day?

Yes___ No___

↓
If your cost increase was: \$7.50/day?

Yes___ No___

↓
If your cost increase was: \$15/day?

Yes___ No___

V. SALTWATER PRIVATE BOAT FISHING

Complete this section only if you fished from a private boat in 1983.

1. How many private boat fishing trips did you take in 1983? _____ trips

2. Of these trips, how many did you take in which the principal species sought was:

ALBACORE/TUNA _____ trips

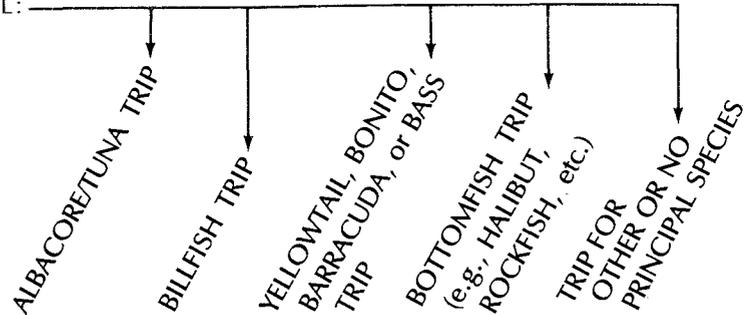
BILLFISH _____ trips

YELLOWTAIL, BONITO, BARRACUDA, or BASS _____ trips

BOTTOMFISH (e.g., HALIBUT, ROCKFISH, etc.) _____ trips

OTHER OR NO PRINCIPAL SPECIES _____ trips

Please answer questions 3 through 8 FOR THE TYPICAL:



3. What was the typical one-way distance in MILES from your residence to the dock/launch site?

--	--	--	--	--

4. What was the typical time spent travelling to the dock/launch site? (e.g., 30 min., 1½ hrs., etc.)

--	--	--	--	--

5. What was the typical time spent fishing in HOURS?

--	--	--	--	--

6. What was the typical number of fish caught of your principal species?

--	--	--	--	--

7. What was the typical number of fish caught of ALL SPECIES?

--	--	--	--	--

8. What was the typical dollar amount spent for yourself on:

• Boat fuel

\$	\$	\$	\$	\$
----	----	----	----	----

• Terminal tackle, bait, licenses, fish cleaning and processing

\$	\$	\$	\$	\$
----	----	----	----	----

• Food, beverages, lodging

\$	\$	\$	\$	\$
----	----	----	----	----

• Gasoline and/or other transportation costs

\$	\$	\$	\$	\$
----	----	----	----	----

(continued on other side)

9. If the cost to you of private boat fishing increased by \$2 per day, would you stop fishing from private boats altogether?

Yes ___ No ___



If the cost increase to you was: \$4/person/day?

Yes ___ No ___



If the cost increase to you was: \$10/person/day?

Yes ___ No ___



If the cost increase to you was: \$20/person/day?

Yes ___ No ___



If the cost increase to you was: \$40/person/day?

Yes ___ No ___



If the cost increase to you was: \$100/person/day?

Yes ___ No ___



If the cost increase to you was: \$200/person/day?

Yes ___ No ___

VI. OTHER ACTIVITIES

1. How many freshwater fishing trips did you take in 1983? _____trips

If ZERO trips, go to Question 4. Otherwise, continue.

2. Please describe below the typical freshwater trip:

Typical length of trip (including travel time) in DAYS (e.g., 1/2-day, 1-day, 2 days, etc.) _____

Typical one-way distance from your residence to fishing site (MILES) _____

Typical time spent fishing (HOURS) _____

Typical total catch (NUMBER OF FISH) _____

3. For the typical freshwater fishing trip, how much did you spend on yourself for:

BOAT FUEL &
LAUNCH FEES

TERMINAL TACKLE,
BAIT, LICENSES

FOOD, BEVERAGES,
LODGING

GASOLINE AND/OR OTHER
TRANSPORTATION COSTS

\$ _____

\$ _____

\$ _____

\$ _____

4. Check those activities in which you participated during 1983:

hunting
 camping
 tennis

golf
 sailing
 surfing/swimming

scuba diving
 indoor sports
 musical/theatrical events

5. Check if you subscribe to or read on a regular basis:

sports section of daily newspaper
 outdoor sports magazine other than fishing magazine
 business periodical

spectator sports magazine
 weekly news magazine

VII. DEMOGRAPHIC CHARACTERISTICS

The following questions are about you and your household and will help us to know more about saltwater sportfishermen. We emphasize that all of your answers are strictly confidential.

1. Were you employed in 1983? _____ Yes _____ No

If NO, skip to Question 4.

2. How many hours on average did you work per week in 1983?
(include vacation and sick leave time) _____Hours

3. How many paid vacation and sick leave days did you have in 1983? _____ Days

4. Check the category which best describes your 1983 household income:

<input type="checkbox"/> less than \$5,000	<input type="checkbox"/> \$15,000-19,999	<input type="checkbox"/> \$40,000-49,999	<input type="checkbox"/> \$70,000-79,999
<input type="checkbox"/> \$5,000- 9,999	<input type="checkbox"/> \$20,000-29,999	<input type="checkbox"/> \$50,000-59,999	<input type="checkbox"/> \$80,000-89,999
<input type="checkbox"/> \$10,000-14,999	<input type="checkbox"/> \$30,000-39,999	<input type="checkbox"/> \$60,000-69,999	<input type="checkbox"/> \$90,000-99,999
<input type="checkbox"/> over \$100,000			

5. How many adults (18 years of age and older) in your household in 1983? (please specify) _____

6. How many children (under 18 years of age) in your household in 1983? (please specify) _____

7. Which category best describes your role in the household in 1983?

a principal wage earner homemaker retired student other

8. How long have you participated in saltwater sportfishing?

less than 1 year 1-5 years 6-10 years 11-20 years more than 20 years

9. Is saltwater sportfishing your favorite recreational activity?

Yes No

10. Did you do any saltwater sportdiving in 1983?

Yes No

11. What is your current age?

less than 18 years old 18 to 25 26 to 35 36 to 60 over 60 years old

12. Are you male or female?

Male Female

13. What is your county of residence?

San Diego San Bernardino Ventura San Luis Obispo
 Orange Riverside Santa Barbara Other California
 Los Angeles Imperial Kern Outside California

14. What is your zip code? _____

The last question is asked to help us better understand the value of time spent fishing.

15. For the typical 1983 saltwater fishing trip, would you have been working if you hadn't gone fishing?

Yes No



Would you have received payment for that worktime?

Yes No



Which category best describes the hourly rate that you would have been paid if you had been working:

below \$5/hr. \$7.50-10/hr. \$15-20/hr. \$25-30/hr.
 \$5-7.50/hr. \$10-15/hr. \$20-25/hr. over \$30/hr.

Do you have any other comments?

APPENDIX B

Logit Equations for Modal Choice --
Party/Charter Boat, Private Boat, and Shore

Table B-1. Results of Stepwise Logistic Regression Procedure for Boatowners

Dependent Variable: Parct

FINAL PARAMETER ESTIMATES

VARIABLE	BETA	STD. ERROR	CHI-SQUARE	P
INTERCEPT	2.77941567	0.92008509	9.13	0.0025
AGE	-0.91834179	0.21342759	18.51	0.0000
TROL	1.00411684	0.33201394	9.15	0.0025
FAV	1.04106227	0.31825702	10.70	0.0011
DUMLA	0.34790055	0.28212642	8.97	0.0027
CAST	0.97527554	0.40901522	5.69	0.0171

FRACTION OF CONCORDANT PAIRS OF PREDICTED PROBABILITIES AND RESPONSES
 RANK CORRELATION BETWEEN PREDICTED PROBABILITY AND RESPONSE

DEPENDENT VARIABLE: PRBT

FINAL PARAMETER ESTIMATES

VARIABLE	BETA	STD. ERROR	CHI-SQUARE	P	R
INTERCEPT	-2.42774043	0.37080968	42.86	0.0000	
HUNT	0.76163425	0.24728351	9.49	0.0021	0.096
SPECSPT	0.70856546	0.22953713	9.53	0.0020	0.097
SAIL	0.92039951	0.27964854	10.83	0.0010	0.105
TROL	0.71585414	0.25223018	3.05	0.0045	0.087
DUMOR	0.66474915	0.22985703	8.36	0.0038	0.089
FAV	0.91187343	0.27771620	10.78	0.0010	0.104
CAMP	0.56276821	0.18478884	9.27	0.0023	0.095
DUMSBE	-1.37765783	0.64980440	4.49	0.0340	-0.056
GOLF	0.46913834	0.21403544	4.80	0.0284	0.059

DEPENDENT VARIABLE: SHOF

FINAL PARAMETER ESTIMATES

VARIABLE	BETA	STD. ERROR	CHI-SQUARE	P	R
INTERCEPT	-0.93303516	0.42673533	4.78	0.0283	
TROL	-1.12423863	0.24782450	20.58	0.0000	-0.152
CAMP	0.60935731	0.19191319	10.08	0.0015	0.101
HHINC	-0.00001714	0.00000439	15.24	0.0001	-0.129
SPGR	0.83406817	0.26830224	9.66	0.0019	0.098
FAV	0.76802929	0.27529794	7.78	0.0053	0.085
DUMLA	0.45603726	0.18696977	5.95	0.0147	0.070
INDO	0.42704876	0.19795538	4.65	0.0310	0.058
SURF	0.39623410	0.19643560	4.07	0.0437	0.051

Table B-2. Results of Stepwise Logistic Regression Procedure for Non-Boat Owners

DEPENDENT VARIABLE: PARCT

FINAL PARAMETER ESTIMATES

VARIABLE	BETA	STD. ERROR	CHI-SQUARE	P	R
INTERCEPT	-0.75578555	0.73946301	1.04	0.3067	
AGE	-0.42753649	0.15166840	7.95	0.0048	-0.082
XPERSW	0.33523112	0.08961565	13.99	0.0002	0.117
SPECSPT	0.64427532	0.23390702	7.59	0.0059	0.080
CAMP	0.52483179	0.17613943	8.88	0.0029	0.088
SCUB	-0.69997728	0.23246516	9.07	0.0026	-0.090
STUD	8.71234468
DUMLA	0.68481294	0.17478439	15.35	0.0001	0.123
DUMSBE	1.15387445	0.49822282	5.36	0.0206	0.062
CAST	0.72142496	0.34906977	4.27	0.0388	0.051

FRACTION OF CONCORDANT PAIRS OF PREDICTED PROBABILITIES AND RESPONSES :0.677
 RANK CORRELATION BETWEEN PREDICTED PROBABILITY AND RESPONSE :0.389

DEPENDENT VARIABLE: PRBT

FINAL PARAMETER ESTIMATES

VARIABLE	BETA	STD. ERROR	CHI-SQUARE	P	R
INTERCEPT	0.80896386	1.04152383	0.60	0.4373	
DUMSLO	-8.93407362
AGE	-0.52749059	0.23653507	4.97	0.0257	-0.076
DUMOR	3.21794235	0.50463778	40.66	0.0000	0.275
MUSIC	1.02647233	0.32178696	10.18	0.0014	0.126
FLYF	-0.79016640	0.30234442	6.83	0.0090	-0.097
DUMSD	2.96738154	0.53555814	30.70	0.0000	0.237
DUMLA	2.36108064	0.36948873	40.83	0.0000	0.275
SCUB	1.43435343	0.54874935	6.83	0.0090	0.097
DUMRSD	2.75374390	0.83379009	10.91	0.0010	0.132
DUMVEN	2.59589726	0.82738054	9.84	0.0017	0.124
DUMSBE	1.82383442	0.66486486	7.52	0.0061	0.104
HUNT	0.87410691	0.33782487	6.69	0.0097	0.096
FAV	0.69608867	0.31408906	4.91	0.0267	0.075

Table B-2. Continued

DEPENDENT VARIABLE: SHOR

FINAL PARAMETER ESTIMATES

VARIABLE	BETA	STD. ERROR	CHI-SQUARE	P	R
INTERCEPT	-0.93455710	0.77221794	1.46	0.2262	
CAMP	0.65456090	0.19232186	11.58	0.0007	0.108
AGE	-0.44526068	0.15460349	8.29	0.0040	-0.087
XPERSW	0.36296190	0.10133665	12.83	0.0003	0.114
SURF	0.44053788	0.18626210	5.59	0.0180	0.066
HHINC	-0.00001054	0.00000442	5.69	0.0170	-0.067
SPGR	0.75364522	0.32286539	5.45	0.0196	0.065
STUD	1.79733654	0.85072238	4.46	0.0346	0.055
SPECSPT	0.52065875	0.22863650	5.19	0.0228	0.062
TROL	-0.73039613	0.32855642	4.94	0.0262	-0.060
DUMVEN	0.93555603	0.44935467	4.33	0.0373	0.053

FRACTION OF CONCORDANT PAIRS OF PREDICTED PROBABILITIES AND RESPONSES :0.702
 RANK CORRELATION BETWEEN PREDICTED PROBABILITY AND RESPONSE :0.423

APPENDIX C

Calculation of Consumer Surplus

CALCULATION OF CONSUMER SURPLUS

Travel Cost Method

The Marshallian consumer surplus associated with the demand functions (1), (2), and (3), is the angler's current number of trips divided by the coefficient of money price (or full price) and takes the form:

$$\begin{aligned} CS &= \int_{p_o}^{\infty} (e^{\alpha + \beta p + \gamma Y}) dp \\ &= \frac{e^{\alpha + \beta p_o + \gamma Y}}{\beta} \\ &= \frac{x_o}{\beta} \end{aligned} \tag{C-1}$$

where P_o is the actual price to the individual for a given mode and x_o is the actual number of trips. It follows from (C-1) that the consumer surplus per trip (as opposed to consumer surplus over the entire fishing season) is:

$$CS/\text{trip} = CS/x_o = \frac{1}{\beta} \tag{C-2}$$

In Chapter 6 of Bockstael, Hanemann, and Strand (1984), a discussion is presented on whether the predicted or observed number of trips in the numerator of (C-1) should be used. This decision depends in part on how the stochastic error term in the regression equation is interpreted. In the present context, however, this issue does not arise. To extrapolate from our sample of anglers to the general population of southern California marine recreational fishermen, our estimate of consumer surplus per trip, based on (C-2), is multiplied by the assumed number of trips that a typical southern California angler takes in a particular mode. In effect, the typical population value of x_o is used as the numerator in (C-1).

Two other points must be mentioned. First, whereas the fitted regression equations presented in Tables 10 and 11 provide an estimate of β , an estimate of its inverse, $1/\beta$ is required. As a first approximation, the inverse of our estimate of β could be used; however, this approach can be improved. If z is a random variable with mean μ and variance σ^2 , then

$$E\left\{\frac{1}{z}\right\} \approx \frac{1}{\mu} \left[\frac{1 + \sigma^2}{\mu^2} \right] \tag{C-3}$$

In the present context, in which β is the true coefficient, $\hat{\beta}$ is our regression estimate (since $E(\hat{\beta}) = \beta$) and $\sigma_{\hat{\beta}}$ is the standard deviation of our estimate,

$$E \left\{ \frac{1}{\hat{\beta}} \right\} = \frac{1}{\beta} \left[1 + \frac{\hat{\sigma}^2}{\beta^2} \right] = \frac{1}{\beta} \left[1 + \frac{1}{t^2} \right] > \frac{1}{\beta} \quad (C-4)$$

where t is the estimated t -statistic associated with $\hat{\beta}$. It follows from (C-4) that $(1/\hat{\beta})$ is an overestimate of $(1/\beta)$, and that a better estimate is given by

$$\frac{1}{\hat{\beta}} \left[1 + \frac{1}{t^2} \right]^{-1} \quad (C-5)$$

A second point concerns the distinction between Marshallian consumer surplus and the true compensating (or equivalent) variation. If $\gamma=0$ (i.e., no income effects), the ordinary demand function is equivalent to the compensated demand function and, therefore, the true compensating (or equivalent) variation derived from the indirect utility function underlying (2) coincides with CS given in (C-1). If there are income effects, however, the two estimates of consumer surplus differ; Hanemann (1982) shows that the compensating variation is related to Marshallian consumer surplus by the formula:

$$CV = \frac{1}{\gamma} \ln(1 + \gamma cs) \quad (C-6)$$

Since income effects do not appear in most of our regression equations (i.e., our estimate of γ is not statistically significant), it follows from (C-6) that the Marshallian consumer surplus coincides with the true compensation measure. Therefore, the net benefit per trip is legitimately measured by (C-5).

Contingent Valuation

The behavioral information generated by angler responses to survey questions about hypothetical price increases (e.g., "If the cost of party/charter boat fishing increased by \$10 per trip, would you stop taking party/charter boat trips altogether?) is essentially of a discrete rather than a continuous nature; that is, the exact cut-off price at which the individual's demand would fall to zero is not obtained, but rather the range within which the cut-off price occurs. An appropriate statistical model for analyzing such data is presented in Hanemann (1985). In this study, however, a simple heuristic analysis of the data captures the crucial feature of the more complex model; that is, from the responses to our questions, sufficient information is obtained to estimate the individual's demand function for the mode of fishing. The Marshallian consumer surplus can then be estimated from these demand functions.

To accomplish this, some assumptions about the form of the demand functions are needed. The simplest case is to assume the linear form*:

$$X = \alpha - \beta p \quad (C-7)$$

where x is the number of party/charter boat trips by the individual and p is the cost of the typical trip. All other shift variables that affect demand are included in the intercept term. We know x_0 and p_0 , the actual number of trips made by the individual and the actual price. We also know the range containing Δ , the amount by which the cut-off price exceeds p_0 . If Δ was known, then

$$0 = \alpha - \beta(p_0 + \Delta) \quad (C-8)$$

and

$$x_0 = \alpha - \beta p_0 \quad (C-9)$$

Equations 11 and 12 could be solved for the following estimates of α and β :

$$\hat{\beta} = x_0 / \Delta \quad (C-10)$$

$$\hat{\alpha} = \hat{\beta}(p_0 + \Delta) \quad (C-11)$$

The Marshallian consumer surplus could then be estimated from

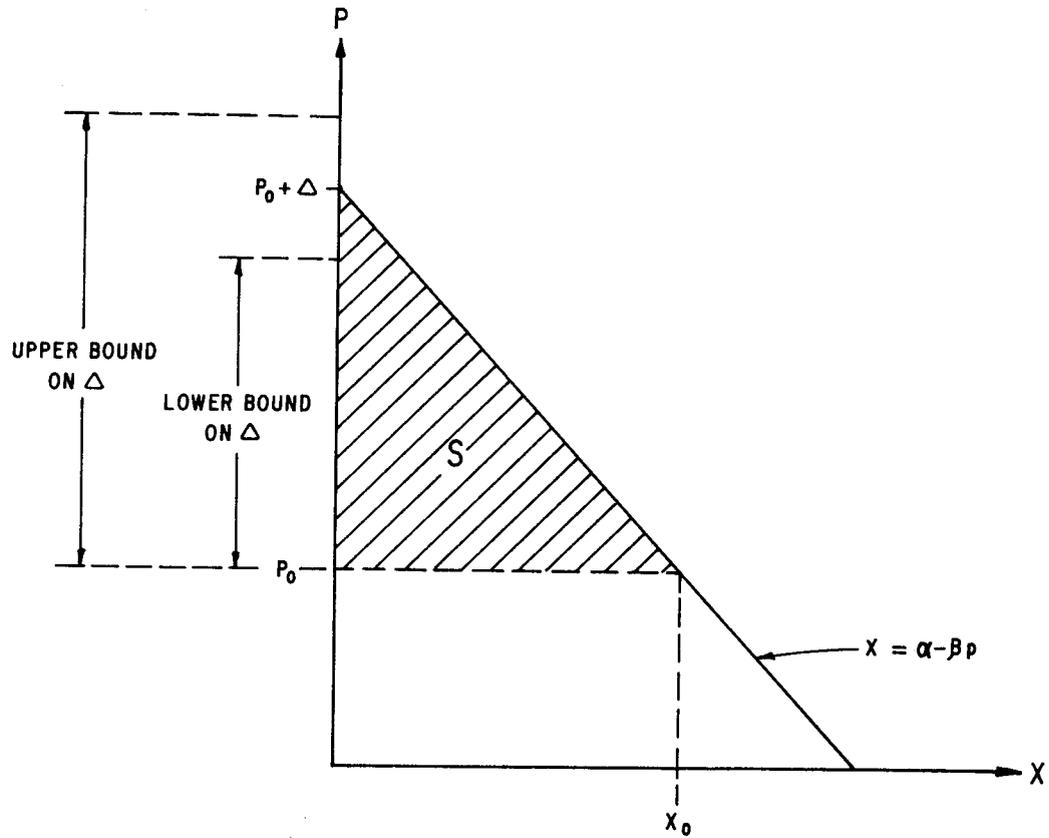
$$\hat{s} = \frac{\alpha^2}{2\beta} - \alpha p_0 + \frac{\beta p_0^2}{2} \quad (C-12)$$

$$= \frac{1}{2} \Delta x_0 \quad (C-13)$$

This calculation is illustrated in Figure C-1.

Since Δ is not known exactly, but only the range in which it occurs, the midpoint of this range is used as the estimate of Δ . For some respondents, however, only a lower bound, rather than a range, is provided on the value of Δ . These individuals indicated that they would not stop fishing at any of the cost increases mentioned. In these cases we estimated Δ at 20 percent and 50 percent above the highest cost increase identified. Using these estimates of Δ and the recorded number of trips, x_0 , Δ was calculated from (C-13) for each individual and for each of the activity modes.

*The semilog form cannot be employed here because it implies a cut-off price of infinity. An alternative would be some translation of the semilog function designed to yield a finite cut-off price. Its estimation, however, would require the more complex procedure described in Hanemann (1985).



-LEGEND-
P = Price of Trips
X = Number of Trips
S = Consumer Surplus

FIGURE C-1. DERIVATION OF MARSHALLIAN CONSUMER SURPLUS FROM CONTINGENT VALUATION QUESTIONS

APPENDIX D

Input Worksheets for Analysis of Economic Impacts

Table D-1. SCAG Region [I-A] Inverse, 8-Sector Model

	Farming	Ag. Serv.	Mining	Manuf.	Trade	Services	Govt.	Other
Farming	1.0627	0.0815	0.0021	0.0227	0.0018	0.0025	0.0022	0.0040
Ag. Services	0.0431	1.0304	0.0003	0.0012	0.0007	0.0012	0.0004	0.0010
Mining	0.0027	0.0028	1.0147	0.0148	0.0012	0.0022	0.0019	0.0048
Manufacturing	0.1444	0.1793	0.0972	1.3297	0.0692	0.1538	0.1093	0.1575
Trade	0.0561	0.0538	0.0210	0.0459	1.0211	0.0361	0.0229	0.0413
Services	0.0449	0.1483	0.0611	0.0749	0.0836	1.1544	0.0585	0.0876
Government	0.0015	0.0047	0.0025	0.0042	0.0060	0.0073	1.0014	0.0046
Other	0.1055	0.1573	0.2235	0.0979	0.1214	0.1447	0.1295	1.1744

Source: Applied Economic Systems, October 1984, using Regional Interindustry Modeling System.

Table D-2. SCAG Region [I-A] Inverse, 9-Sector Model

	Farming	Ag. Serv.	Mining	Manuf.	Trade	Services	Govt.	Other	Households
Farming	1.0512	0.0986	0.0119	0.0391	0.0192	0.0270	0.0275	0.0184	0.0325
Ag. Services	0.0430	1.0317	0.0010	0.0025	0.0020	0.0026	0.0023	0.0021	0.0024
Mining	0.0047	0.0073	1.0172	0.0190	0.0054	0.0068	0.0061	0.0064	0.0080
Manufacturing	0.2934	0.5106	0.2731	1.6308	0.3798	0.4883	0.5612	0.4165	0.5813
Trade	0.1524	0.2665	0.1340	0.2402	1.2205	0.2505	0.3128	0.2075	0.3731
Services	0.1761	0.4367	0.2142	0.3369	0.3540	1.4455	0.4518	0.3130	0.5059
Government	0.0051	0.0125	0.0066	0.0113	0.0133	0.0152	1.0120	0.0107	0.0136
Other	0.2113	0.3928	0.3486	0.3120	0.3423	0.3825	0.4508	1.3585	0.4134
Households	0.4396	0.9609	0.5101	0.8731	0.9697	0.9657	1.3098	0.7508	1.6853

Source: Applied Economic Systems, October 1984, using Regional Interindustry Modeling System.

Table D-3. California Gross Output Multipliers, Selected
Input-Output (I-O) Sectors

I-O Sector	Multipliers	
	Households Excluded	Households Included
99 Ship and boat building and repair	2.148	3.682
117 Transportation services	2.205	4.186
124 Eating and drinking places	2.201	3.435
125 Retail trade	1.828	3.189
128 Insurance	2.395	3.927
131 Hotels and lodging	2.120	3.409
139 Amusements and recreation services	2.090	3.417
148 Local government passenger transit	2.294	4.035

Note: Multipliers with households excluded (open I-O model) represent direct and indirect economic effects (interindustry effects only). Multipliers with households included (closed I-O model) represent direct, indirect, and induced economic effects (interindustry impacts plus household responding effects).

Source: Output multipliers for California estimated by AES using the Regional Interindustry Modeling System, February 1983.

Table D-4. Industry Output, Employment, and Output Per Worker
for 8 Industrial Sectors

<u>I-0 Sector Number 1</u>	<u>Total Output 2</u>	<u>Wage and Salary Employment 3</u>	<u>Output per Worker 4</u>
99	5,476	220	24,891
117	2,421	196	12,352
124	57,805	4,626	12,496
125	141,637	10,452	13,551
128	45,319	1,676	27,040
131	10,854	1,293	8,394
139	14,530	763	19,043
148	2,323	172	13,506

Source: Bureau of Labor Statistics, U.S. Department of Labor

- Notes:
1. Sector numbers correspond to column 1 of Table A.
 2. Total industry output in 1980 in millions of 1972 dollars.
 3. Total industry wage and salary employment in thousands of jobs.
 4. Industry output per wage and salary worker in 1972 dollars.

Table D-5. Indirect Gross Output Multipliers for Selected Input-Output Sectors

Business Sector	Total Retail Sales	Proportion of Indirect Gross Output by Aggregated Sectors							Gross Output Multiplier			
		Farming	Ag Services	Mining	Manufacturing	Trade	Services	Government		Other		
Amusement & Rec. Services												
-Low	\$105,756,000	0.0118	0.0017	0.0030	0.2132	0.0500	1.6000	0.0101	0.2006	0.2006	2.0904	2.0904
-High	\$109,284,000	0.0118	0.0017	0.0030	0.2132	0.0500	1.6000	0.0101	0.2006	0.2006	2.0904	2.0904
Retail Trade												
-Low	\$379,765,000	0.0025	0.0010	0.0017	0.0969	1.4306	0.1171	0.0084	0.1701	0.1701	1.8283	1.8283
-High	\$620,178,000	0.0025	0.0010	0.0017	0.0969	1.4306	0.1171	0.0084	0.1701	0.1701	1.8283	1.8283
Eating and Drinking Places												
-Low	\$50,516,000	0.0124	0.0018	0.0032	0.2244	0.0527	1.6843	0.0107	0.2111	0.2111	2.2006	2.2006
-High	\$10,520,000	0.0120	0.0017	0.0031	0.2162	0.0508	1.6231	0.0103	0.2034	0.2034	2.1206	2.1206
Local Gov't Transit												
-Low	\$1,019,000	0.0038	0.0007	0.0033	0.1891	0.0396	0.1012	1.7324	0.2240	0.2240	2.2941	2.2941
-High	\$65,440,000	0.0306	0.0016	0.0200	1.7938	0.0633	0.1010	0.0057	0.1321	0.1321	2.1481	2.1481
Insurance												
-Low	\$20,365,000	0.0065	0.0016	0.0078	0.2556	0.0670	0.1422	0.0075	1.9016	1.9016	2.3898	2.3898
-High	\$23,329,000	0.0065	0.0016	0.0078	0.2556	0.0670	0.1422	0.0075	1.9016	1.9016	2.3898	2.3898

NOTES: TOTAL RETAIL SALES derived from Table 19.
 PROPORTION OF INDIRECT GROSS OUTPUT disaggregation based on 8-sector SCAG Regional Model; source of data is Applied Economic Systems using the Regional Interindustry Modeling System.
 GROSS OUTPUT MULTIPLIER source is Applied Economic Systems using the Regional Interindustry Modeling System.

Table D-6. Induced Gross Output Multipliers for Selected Input-Output Sectors

Business Sector	Total Retail Sales	Farming	Ag Services	Mining	Proportion of Induced Gross Output by Aggregated Sectors				Other	Households	Gross Output Multiplier
					Manufacturing	Trade	Services	Government			
Amusement & Rec. Services											
-Low	\$105,756,000	0.0257	0.0025	0.0065	0.4650	0.2388	1.3765	0.0145	0.3642	0.9234	3.4170
-High	\$109,284,000	0.0257	0.0025	0.0065	0.4650	0.2388	1.3765	0.0145	0.3642	0.9234	3.4170
Retail Trade											
-Low	\$379,765,000	0.0185	0.0019	0.0052	0.3663	1.1772	0.3415	0.0128	0.3302	0.9353	3.1890
-High	\$620,178,000	0.0185	0.0019	0.0052	0.3663	1.1772	0.3415	0.0128	0.3302	0.9353	3.1890
Eating and Drinking Places											
Hotels and Lodging	\$50,516,000	0.0258	0.0025	0.0065	0.4674	0.2401	1.3837	0.0146	0.3661	0.9282	3.4350
Local Gov't Transit	\$10,520,000	0.0257	0.0025	0.0065	0.4639	0.2383	1.3732	0.0144	0.3634	0.9212	3.4090
Ship and Boat Building	\$1,019,000	0.0268	0.0022	0.0079	0.5475	0.3051	0.4407	0.9872	0.4398	1.2777	4.0350
-Low	\$65,440,000	0.0415	0.0027	0.0202	1.7330	0.2553	0.3580	0.0120	0.3315	0.9278	3.6820
-High	\$74,147,000	0.0415	0.0027	0.0202	1.7330	0.2553	0.3580	0.0120	0.3315	0.9278	3.6820
Insurance											
-Low	\$20,365,000	0.0234	0.0027	0.0107	0.5300	0.2641	0.3983	0.0136	1.7288	0.9554	3.9270
-High	\$23,329,000	0.0234	0.0027	0.0107	0.5300	0.2641	0.3983	0.0136	1.7288	0.9554	3.9270

NOTES: TOTAL RETAIL SALES derived from Table 19.

PROPORTION OF INDIRECT GROSS OUTPUT disaggregation based on 9-sector SCAG Regional Model; source of data is Applied Economic Systems using the Regional Interindustry Modeling System.

GROSS OUTPUT MULTIPLIER source is Applied Economic Systems using the Regional Interindustry Modeling System.

Table D-7. Productivity Estimates by Aggregated Industry Sector (thousands of 1983 dollars per worker)

Business Sector	Productivity by Sector (\$1,000)							
	Farming	Ag Services	Mining	Manufacturing	Trade	Services	Government	Other
Amusement & Recreation Services	52.32	28.12	589.88	110.84	34.10	41.16	35.87	128.53
Retail Trade	52.32	28.12	589.88	110.84	34.10	41.16	35.87	128.53
Eating and Drinking Places	52.32	28.12	589.88	110.84	34.10	41.16	35.87	128.53
Hotels and Lodging	52.32	28.12	589.88	110.84	34.10	41.16	35.87	128.53
Local Gov't Transit	52.32	28.12	589.88	110.84	34.10	41.16	35.87	128.53
Ship and Boat Building	52.32	28.12	589.88	110.84	34.10	41.16	35.87	128.53
Insurance	52.32	28.12	589.88	110.84	34.10	41.16	35.87	128.53

SOURCE: Applied Economic Systems using industry data from the U. S. Bureau of Labor Statistics.

Table D-8. Earnings to Employment Ratio by Aggregated Industry Sector (thousands of 1983 dollars per employee)

Business Sector	Earnings to Employment Ratio by Sector (in thousands)			Earnings to Employment Ratio by Sector (in thousands)			Other
	Farming	Ag Services	Mining	Manufacturing	Trade	Services	
Amusement & Recreation Services	27.75	11.74	35.85	25.72	16.00	19.47	18.52
Retail Trade	27.75	11.74	35.85	25.72	16.00	19.47	18.52
Eating and Drinking Places	27.75	11.74	35.85	25.72	16.00	19.47	18.52
Hotels and Lodging	27.75	11.74	35.85	25.72	16.00	19.47	18.52
Local Gov't Transit	27.75	11.74	35.85	25.72	16.00	19.47	18.52
Ship and Boat Building	27.75	11.74	35.85	25.72	16.00	19.47	18.52
Insurance	27.75	11.74	35.85	25.72	16.00	19.47	18.52

SOURCE: U. S. Bureau of Economic Analysis, 1984. Regional Economic Information System.

APPENDIX E

Summary Statistics from Southern California Angler Survey

Talbe E-1. Summary Statistics for 1983 Saltwater Fishing

VARIABLE NUMBER	NAME OF VARIABLE	MEAN VALUE	MEDIAN VALUE	RANGE
1	Individual identification	-	-	-
2	Owned boat in 1983	Yes 711 (52%) No 650 (48%)	-	-
3	Owned more than one boat in 1983	Yes 191 (27%) No 520 (73%)	-	-
4	Was boat #1 powered?	Yes 687 (97%) No 24 (3%)	-	-
5	<u>Boat 1:</u> % of time used for saltwater fishing	69.1%	90%	0-100
6	% of time used for freshwater fishing	14.4%	0%	0-100
7	% of time used for cruising	9.3%	0	0-95
8	% of time used for other	7.2%	0	0-100
9	<u>Boat 1:</u> 1983 expenditures on boat payments	\$2,572.35	0	0-\$170,000
10	1983 expenditures on boat maintenance	\$763.05	\$200	0-\$70,000
11	1983 expenditures on boat repairs	\$599.80	\$175	0-\$14,000
12	1983 expenditures on boat insurance	\$319.60	\$200	0-\$9,500
13	1983 expenditures on slip rental	\$617.70	0	0-\$10,000
14	Was boat #2 powered?	Yes 150 (79%) No 41 (21%)	-	-
15	<u>Boat 2:</u> % of time used for saltwater fishing	38.4%	10%	0-100
16	% of time used for freshwater fishing	25.8%	0	0-100
17	% of time used for cruising	10.9%	0	0-100
18	% of time used for other	23.5%	0	0-100
19	<u>Boat 2:</u> 1983 expenditures on boat payments	\$914.72	0	0-\$30,000
20	1983 expenditures on boat maintenance	\$198.51	\$75	0-\$2,800
21	1983 expenditures on boat repairs	\$242.30	\$17.50	0-\$6,000
22	1983 expenditures on boat insurance	\$119.55	\$25	0-\$1,090
23	1983 expenditures on slip rental	\$122.87	0	0-\$1,800
<u>Ownership of Fishing Gear and Equipment in 1983:</u>				
24	Outboard Motors	Yes 552 (41%) No 809 (59%)	-	-
25	Boat Trailer	Yes 552 (41%) No 809 (59%)	-	-
26	Boat electronic equipment	Yes 550 (40%) No 811 (60%)	-	-
27	Outriggers, chairs, and harnesses	Yes 366 (27%) No 995 (73%)	-	-
28	Spinning Gear	Yes 1,166 (86%) No 195 (14%)	-	-
29	Bait-casting Gear	Yes 1,259 (92%) No 102 (8%)	-	-
30	Trolling gear	Yes 1,185 (87%) No 176 (13%)	-	-
31	Fly-fishing gear	Yes 344 (25%) No 1,017 (75%)	-	-
32	Amount spent in 1983 on saltwater durable gear and equipment excluding boats, motors, and trailers	\$492.82	\$300	0-\$25,000
33	Amount spent in 1983 on saltwater terminal tackle	\$180.42	\$100	0-\$5,000
34	Participated in party/charter boat fishing in 1983	Yes 1,007 (73%) No 376 (27%)	-	-
35	Participated in rental boat fishing in 1983	Yes 103 (7%) No 1,280 (93%)	-	-
36	Participated in shore fishing in 1983	Yes 522 (38%) No 861 (62%)	-	-
37	Participated in private boat fishing in 1983	Yes 912 (66%) No 471 (34%)	-	-
38	Completed Section 6 and/or 7	Yes 1,359 (98%) No 24 (2%)	-	-

Table E-2. Summary Statistics for Party/Charter Boat Fishing

<u>VARIABLE NUMBER</u>	<u>NAME OF VARIABLE</u>	<u>MEAN VALUE</u>	<u>MEDIAN VALUE</u>	<u>RANGE</u>
1	Individual identification			
2	Number of party/charter boat trips in 1983	8.3	5	1-150
	<u>Season of trip:</u>			
3	trip #1 - summer 710 (72%) winter 276 (28%) Don't Know 5	-	-	-
4	trip #2 - summer 655 (76%) winter 200 (24%) Don't Know 4	-	-	-
5	trip #3 - summer 588 (81%) winter 134 (19%) Don't Know 3	-	-	-
6	trip #4 - summer 466 (76%) winter 146 (24%) Don't Know 1	-	-	-
7	trip #5 - summer 346 (67%) winter 171 (33%) Don't Know 2	-	-	-
	<u>One-way distance in miles from residence to dock site:</u>			
8	trip #1	82.8	50	1-2,400
9	trip #2	74.6	45	1-2,400
10	trip #3	68.6	45	1-1,100
11	trip #4	62.1	40	1-600
12	trip #5	61.6	40	1-600
	<u>Travel time in minutes from residence to dock site:</u>			
13	trip #1	95	60	3-1,500
14	trip #2	86	60	1-1,500
15	trip #3	82	60	2-1,350
16	trip #4	75	60	3-630
17	trip #5	76	60	3-630
	<u>This P/C trip part of a longer trip or vacation:</u>			
18	trip #1 yes 79 (8%) no 916 (92%)	-	-	-
19	trip #2 yes 51 (6%) no 807 (94%)	-	-	-
20	trip #3 yes 46 (6%) no 679 (94%)	-	-	-
21	trip #4 yes 34 (6%) no 574 (94%)	-	-	-
22	trip #5 yes 31 (6%) no 476 (94%)	-	-	-
	<u>Length of boat trip in days:</u>			
23	trip #1	1.88	1	.5-16
24	trip #2	1.54	1	.5-23
25	trip #3	1.41	1	.5-18
26	trip #4	1.34	1	.5-15
27	trip #5	1.49	1	.5-16
	<u>Fished for a principal species:</u>			
28	trip #1 yes 726 (73%) no 263 (27%)	-	-	-
29	trip #2 yes 610 (71%) no 244 (29%)	-	-	-
30	trip #3 yes 541 (75%) no 179 (25%)	-	-	-
31	trip #4 yes 456 (75%) no 150 (25%)	-	-	-
32	trip #5 yes 389 (77%) no 115 (23%)	-	-	-

Principal species sought:

33	trip #1	alb/tuna 270 (33%)	BF	1 (<1%)	B/Y/B/B 328 (40%)	-	-	-
		BTMF 147 (18%)	other	17 (2%)	combo 47 (6%)	-	-	-
34	trip #2	alb/tuna 244 (34%)	BF	4 (1%)	B/Y/B/B 293 (41%)	-	-	-
		BTMF 109 (15%)	other	18 (3%)	combo 43 (6%)	-	-	-
35	trip #3	alb/tuna 234 (38%)	BF	3 (<1%)	B/Y/B/B 273 (44%)	-	-	-
		BTMF 65 (11%)	other	11 (2%)	combo 31 (5%)	-	-	-
36	trip #4	alb/tuna 198 (38%)	BF	3 (1%)	B/Y/B/B 224 (43%)	-	-	-
		BTMF 67 (13%)	other	5 (1%)	combo 30 (6%)	-	-	-
37	trip #5	alb/tuna 150 (33%)	BF	4 (1%)	B/Y/B/B 184 (41%)	-	-	-
		BTMF 79 (18%)	other	11 (2%)	combo 23 (5%)	-	-	-

Number of fish caught of principal species:

38	trip #1					9.2	6	0-88
39	trip #2					9.0	7	0-75
40	trip #3					8.7	6	0-110
41	trip #4					8.4	6	0-150
42	trip #5					9.1	6	0-100

Number of fish caught of all species:

43	trip #1					14.1	10	0-130
44	trip #2					13.4	10	0-150
45	trip #3					12.4	10	0-150
46	trip #4					12.2	10	0-200
47	trip #5					13.6	10	0-100

Expenditures on boat fees:

48	trip #1					\$169.90	\$40	\$0-\$2,500
49	trip #2					\$128.97	\$40	\$0-\$3,000
50	trip #3					\$110.75	\$40	\$0-\$2,400
51	trip #4					\$103.79	\$37	\$0-\$2,625
52	trip #5					\$116.99	\$37	\$0-\$3,000

Expenditures on terminal tackle, bait, equip. rental, etc.:

53	trip #1					\$32.69	\$10	\$0-\$900
54	trip #2					\$24.17	\$10	\$0-\$800
55	trip #3					\$19.09	\$10	\$0-\$400
56	trip #4					\$18.04	\$10	\$0-\$400
57	trip #5					\$22.32	\$10	\$0-\$650

Expenditures on food, beverage, and lodging:

58	trip #1					\$17.44	\$10	\$0-\$450
59	trip #2					\$15.15	\$10	\$0-\$440
60	trip #3					\$15.65	\$10	\$0-\$500
61	trip #4					\$12.76	\$10	\$0-\$100
62	trip #5					\$14.09	\$10	\$0-\$250

Expenditures on gas and/or other trans. costs:

63	trip #1					\$16.14	\$10	\$0-\$500
64	trip #2					\$14.26	\$10	\$0-\$450
65	trip #3					\$12.91	\$10	\$0-\$200
66	trip #4					\$11.31	\$8	\$0-\$100
67	trip #5					\$11.45	\$8	\$0-\$100
68	Lower boundary on per trip cost increase for WTP					\$38.92	\$15	\$0-\$500
69	Upper boundary on per trip cost increase for WTP					\$73.38	\$30	\$5-\$600

Table E-3. Summary Statistics for Rental Boat Fishing

<u>VARIABLE NUMBER</u>	<u>NAME OF VARIABLE</u>	<u>MEAN VALUE</u>	<u>MEDIAN VALUE</u>	<u>RANGE</u>
1	Individual identification			
2	Number of rental boat trips in 1983	2.4	2	1-12
	<u>Season of trip:</u>			
3	trip #1 - summer 78 (76%) winter 23 (23%) Don't Know 1 (1%)	-	-	-
4	trip #2 - summer 49 (80%) winter 12 (20%)	-	-	-
5	trip #3 - summer 25 (74%) winter 8 (24%) Don't Know 1 (2%)	-	-	-
6	trip #4 - summer 10 (50%) winter 10 (50%)	-	-	-
7	trip #5 - summer 8 (50%) winter 8 (50%)	-	-	-
	<u>One-way distance in miles from residence to dock site:</u>			
8	trip #1	37.1	30	1-380
9	trip #2	31.7	27	1-150
10	trip #3	23.7	26	1-60
11	trip #4	26.3	22.5	1-100
12	trip #5	24.1	21	1-100
	<u>Travel time in minutes from residence to dock site:</u>			
13	trip #1	56	45	3-420
14	trip #2	50	45	5-270
15	trip #3	35	35	5-60
16	trip #4	41	37	5-150
17	trip #5	37	37	5-150
	<u>This rental boat trip is part of longer trip or vacation:</u>			
18	trip #1 yes 8 (8%) no 94 (92%)	-	-	-
19	trip #2 yes 5 (8%) no 55 (92%)	-	-	-
20	trip #3 yes 1 (3%) no 32 (97%)	-	-	-
21	trip #4 yes 1 (5%) no 19 (95%)	-	-	-
22	trip #5 yes 1 (6%) no 15 (94%)	-	-	-
	<u>Number of hours rented boat:</u>			
23	trip #1	7.1	8	2-24
24	trip #2	7.7	8	1.5-24
25	trip #3	7.4	8	3-12
26	trip #4	7.7	8	4-12
27	trip #5	8.75	8	5-24
	<u>Fished for a principal species:</u>			
28	trip #1 yes 60 (60%) no 42 (40%)	-	-	-
29	trip #2 yes 40 (67%) no 20 (33%)	-	-	-
30	trip #3 yes 21 (64%) no 12 (36%)	-	-	-
31	trip #4 yes 13 (65%) no 7 (35%)	-	-	-
32	trip #5 yes 7 (44%) no 9 (56%)	-	-	-

Principal species sought:

33	trip #1	SB/B/C 37 (52%)	B/Y/B/B 28 (39%)	-	-	-
		Rockfish 1 (1%)	other 2 (3%)	combo 3 (4%)	-	-
34	trip #2	SB/H/C 22 (48%)	B/Y/B/B 19 (41%)	-	-	-
		Rockfish 1 (2%)	other 2 (4%)	combo 2 (4%)	-	-
35	trip #3	SB/H/C 13 (50%)	B/Y/B/B 9 (35%)	-	-	-
		Rockfish 2 (8%)	other 0 (0%)	combo 2 (8%)	-	-
36	trip #4	SB/H/C 5 (33%)	B/Y/B/B 6 (40%)	-	-	-
		Rockfish 2 (13%)	other 2 (13%)	combo 0 (0%)	-	-
37	trip #5	SB/H/C 5 (45%)	B/Y/B/B 5 (45%)	-	-	-
		Rockfish 0 (0%)	other 1 (9%)	combo 0 (0%)	-	-

Number of fish caught of principal species:

38	trip #1	5.9	5	0-27
39	trip #2	7.1	5	0-35
40	trip #3	7.1	5	1-20
41	trip #4	10.8	5	0-45
42	trip #5	6.5	5	1-15

Number of fish caught of all species:

43	trip #1	9.0	8	0-27
44	trip #2	10.8	10	0-40
45	trip #3	10.9	10	3-30
46	trip #4	13.7	10	0-45
47	trip #5	10.0	10	2-18

Expenditures on boat fees and fuel:

48	trip #1	39.94	28	\$6-\$650
49	trip #2	37.73	25	\$6-\$650
50	trip #3	25.76	20	\$7.50-\$60
51	trip #4	79.45	35	\$0-\$1,000
52	trip #5	33.46	30	\$12-\$60

Expenditures on terminal tackle, boat, equip. rental, etc.:

53	trip #1	5.73	5	\$0-\$20
54	trip #2	5.21	5	\$0-\$20
55	trip #3	4.87	5	\$0-\$15
56	trip #4	8.20	5	\$0-\$50
57	trip #5	6.93	5	\$0-\$25

Expenditures on food, beverage, and lodging:

58	trip #1	11.08	8	\$0-\$350
59	trip #2	13.12	6	\$0-\$350
60	trip #3	6.46	5	\$0-\$20
61	trip #4	7.35	7.50	\$0-\$20
62	trip #5	8.8	10	\$0-\$20

Expenditures on gas and/or other trans. costs:

63	trip #1	7.83	5	\$0-\$50
64	trip #2	7.06	5	\$0-\$50
65	trip #3	4.78	5	\$0-\$20
66	trip #4	7.15	5	\$0-\$30
67	trip #5	7.73	5	\$0-\$50
68	Lower boundary on per day cost increase for WTP	11.46	10	\$0-\$60
69	Upper boundary on per day cost increase for WTP	21.74	20	\$2-\$60

Table E-4. Summary Statistics for Shore Fishing
(Local Residents)

<u>VARIABLE NUMBER</u>	<u>NAME OF VARIABLE</u>	<u>MEAN VALUE</u>	<u>MEDIAN VALUE</u>	<u>RANGE</u>
1	Individual identification	-		
2	Number of trips to a beach or bank (b/b) site	12.3	6	0-182
3	Number of b/b trips from your residence within 50 miles	12.5	6	0-182
4	Number of b/b trips from your residence more than 50 miles	.8	0	0-25
	<u>B/B trips within 50 miles:</u>			
5	Typical one-way distance in miles to site	15.4	12	0-50
6	Typical one-way travel time in minutes	31.2	30	0-120
7	Typical time spent fishing in hours	4.5	4	0-20
8	Typical number of fish caught	4.7	4	0-20
9	Typical dollar amount spent for yourself on terminal tackle, bait, licenses, etc.	\$7.51	5	\$0-\$70
10	Typical dollar amount spent for yourself on food, beverages, lodging	\$5.12	5	\$0-\$50
11	Typical dollar amount spent for yourself on gasoline and/or other transportation costs	\$4.98	5	\$0-\$35
	<u>B/B trips more than 50 miles:</u>			
12	Typical one-way distance in miles to site	103	80	50-300
13	Typical one-way travel time in minutes	136	120	50-360
14	Typical time spent fishing in hours	7.2	6	2-24
15	Typical number of fish caught	7.7	7	0-30
16	Typical dollar amount spent for yourself on terminal tackle, bait, licenses, etc.	\$15.01	\$10	\$0-\$75
17	Typical dollar amount spent for yourself on food, beverages, lodging	\$26.82	\$12	\$0-\$150
18	Typical dollar amount spent for yourself on gasoline and/or other trans. costs	\$25.72	\$20	\$0-\$100
19	Number of trips to pier, jetty, or other man-made (m/m) sites	6.5	2	0-200
20	Number of m/m trips within 50 miles of residence	9.6	5	0-200
21	Number of m/m trips beyond 50 miles of residence	.19	0	0-10
	<u>M/M trips within 50 miles:</u>			
22	Typical one-way distance in miles	14.1	10	0-50
23	Typical one-way travel time in minutes	29	30	0-180

24	Typical time spent fishing in hours	4.2	4	0-13
25	Typical number of fish caught	4.9	4	0-20
26	Typical dollar amount spent for yourself on terminal tackle, bait, licenses, etc.	\$6.28	\$5	\$0-\$40
27	Typical dollar amount spent for yourself on food, beverages, lodging	\$4.29	\$4	\$0-\$20
28	Typical dollar amount spent for yourself on gasoline and/or other trans. costs	\$4.30	\$3	\$0-\$30
<u>M/M trips over 50 miles:</u>				
29	Typical one-way distance in miles	104	80	50-225
30	Typical one-way travel time in minutes	135	120	50-270
31	Typical time spent fishing in hours	5.5	5.5	3-8
32	Typical number of fish caught	6.5	5	0-20
33	Typical dollar amount spent for yourself on terminal tackle, bait, licenses, etc.	\$9.25	\$7	\$0-\$25
34	Typical dollar amount spent for yourself on food, beverages, lodging	\$24.08	\$17.50	\$0-\$100
35	Typical dollar amount spent for yourself on gasoline and/or other trans. costs	\$20.66	\$12.50	\$5-\$60
36	Lower boundary on per day cost increase for WTP	\$7.29	\$5	\$0-\$30
37	Upper boundary on per day cost increase for WTP	\$13.93	\$10	\$1-\$36

Table E-5. Summary Statistics for Shore Fishing
(Non-Local Residents)

<u>VARIABLE NUMBER</u>	<u>NAME OF VARIABLE</u>	<u>MEAN VALUE</u>	<u>MEDIAN VALUE</u>	<u>RANGE</u>
1	Individual identification	-	-	-
2	Number of trips to a beach or bank (B/B) site	8.2	4	0-100
	<u>B/B trips:</u>			
3	Typical one-way distance in miles	50.0	35	0-500
4	Typical one-way travel time in minutes	71	60	0-720
5	Typical time spent fishing in hours	5.6	5	2-40
6	Typical number of fish caught	5.4	5	0-50
7	Typical dollar amount spent for yourself on terminal tackle, bait, licenses, etc.	\$13.14	\$5	0-300
8	Typical dollar amount spent for yourself on food, beverages, lodging	\$19.49	\$5	0-500
9	Typical dollar amount spent for yourself on gasoline and/or other trans. costs	\$14.87	\$7.50	0-250
10	Number of trips to a pier, jetty or other man-made (M/M) site	4.2	1	0-100
	<u>M/M trips:</u>			
11	Typical one-way distance in miles	39.7	30.0	.5-300
12	Typical one-way travel time in minutes	57	45	1-360
13	Typical time spent fishing in hours	5.1	5	1-12
14	Typical number of fish caught	5.5	4.5	0-30
15	Typical dollar amount spent for yourself on terminal tackle, bait, licenses, etc.	\$8.46	\$5	0-50
16	Typical dollar amount spent for yourself on food, beverages, lodging	\$9.34	\$5	0-100
17	Typical dollar amount spent for yourself on gasoline and/or other trans. costs	\$10.61	\$7	0-125
18	Lower bound on per day cost increase for WTP	\$9.33	\$7.50	0-30
19	Upper bound on per day cost increase for WTP	\$16.88	\$15	1-36

Table E-6. Summary Statistics for Private Boat Fishing

<u>VARIABLE NUMBER</u>	<u>NAME OF VARIABLE</u>	<u>MEAN VALUE</u>	<u>MEDIAN VALUE</u>	<u>RANGE</u>
1	Individual identification			
2	Number of private boat fishing trips	13.7	10	1-150
3	Number of private boat trips for albacore/tuna	2.3	0	0-50
4	Number of private boat trips for billfish	1.5	0	0-50
5	Number of private boat trips for yellowtail, bonito, barracuda, bass (y/b/b/b)	6.3	3	0-100
6	Number of private boat trips for bottomfish	2.9	0	0-65
7	Number of private boat trips for other or no principal species	1.4	0	0-75
<u>For the typical albacore/tuna trip:</u>				
8	Typical one-way distance in miles from residence to dock	58.1	30	0-900
9	Typical one-way travel time in minutes	75	45	0-900
10	Typical time spent fishing in hours	10.8	9	2.5-50
11	Typical number of fish caught of principal species	6.0	4	0-45
12	Typical number of fish caught of all species	10.0	7	0-50
13	Typical dollar amount spent for yourself on boat fuel	\$66.50	\$50	\$0-\$650
14	Typical dollar amount spent for yourself on terminal tackle, bait, licenses, etc.	\$25.11	\$15	\$0-\$300
15	Typical dollar amount spent for yourself on food, beverages, lodging	\$24.19	\$12	\$0-\$600
16	Typical dollar amount spent for yourself on gasoline and/or other trans. costs	\$15.09	\$10	\$0-\$150
<u>For the typical billfish trip:</u>				
17	Typical one-way distance in miles from residence to dock	47.0	20	0-1,400
18	Typical one-way travel time in minutes	54	30	0-420
19	Typical time spent fishing in hours	10.7	9	4-48
20	Typical number of fish caught of principal species	.4	0	0-3
21	Typical number of fish caught of all species	2.9	1	0-40
22	Typical dollar amount spent for yourself on boat fuel	\$89.46	\$62.50	\$0-\$650
23	Typical dollar amount spent for yourself on terminal tackle, bait, licenses, etc.	\$38.97	25	\$0-\$500

24	Typical dollar amount spent for yourself on food, beverages, lodging	\$29.45	15	\$0-\$300
25	Typical dollar amount spent for yourself on gasoline and/or other trans. costs	\$14.05	8	\$0-\$400

For the typical y/b/b/b trip:

26	Typical one-way distance in miles from residence to dock	32.3	20	0-800
27	Typical one-way travel time in minutes	49	30	0-840
28	Typical time spent fishing in hours	7.4	7	2-24
29	Typical number of fish caught of principal species	7.3	6	0-50
30	Typical number of fish caught of all species	12.2	10	0-75
31	Typical dollar amount spent for yourself on boat fuel	\$30.87	\$20	\$0-\$300
32	Typical dollar amount spent for yourself on terminal tackle, bait, licenses, etc.	\$15.19	\$10	\$0-\$125
33	Typical dollar amount spent for yourself on food, beverages, lodging	\$14.43	\$10	\$0-\$200
34	Typical dollar amount spent for yourself on gasoline and/or other trans. costs	\$11.19	\$5	\$0-\$300

For the typical bottomfish trip:

35	Typical one-way distance in miles from residence to dock	26.4	15	0-450
36	Typical one-way travel time in minutes	43	30	0-420
37	Typical time spent fishing in hours	6.9	6	1-35
38	Typical number of fish caught of principal species	9.3	8	0-60
39	Typical number of fish caught of all species	13.3	10	0-60
40	Typical dollar amount spent for yourself on boat fuel	\$29.28	\$20	\$0-\$300
41	Typical dollar amount spent for yourself on terminal tackle, bait, licenses, etc.	\$14.58	\$10	\$0-\$200
42	Typical dollar amount spent for yourself on food, beverages, lodging	\$13.43	\$10	\$0-\$200
43	Typical dollar amount spent for yourself on gasoline and/or other trans. costs	\$10.20	\$ 5	\$0-\$150

For the typical trip for other, or no principal species:

44	Typical one-way distance in miles from residence to dock	37.3	20	0-500
45	Typical one-way travel time in minutes	54	30	0-780
46	Typical time spent fishing in hours	6.7	6	1-24

47	Typical number of fish caught of principal species	7.6	5.75	0-35
48	Typical number of fish caught of all species	11.7	10	0-60
49	Typical dollar amount spent for yourself on boat fuel	\$28.69	\$20	\$0-\$360
50	Typical dollar amount spent for yourself on terminal tackle, bait, licenses, etc.	\$10.35	\$10	\$0-\$70
51	Typical dollar amount spent for yourself on food, beverages, lodging	\$13.40	\$10	\$0-\$180
52	Typical dollar amount spent for yourself on gasoline and/or other trans. costs	\$11.68	\$5	\$0-\$200
53	Lower boundary on per day cost increase for WTP	\$35.00	\$20	\$0-\$500
54	Upper boundary on per day cost increase for WTP	\$72.45	\$40	\$2-\$600

Table E-7. Summary Statistics for Other Activities and Demographic Characteristics

<u>VARIABLE NUMBER</u>	<u>NAME OF VARIABLE</u>	<u>MEAN VALUE</u>	<u>MEDIAN VALUE</u>	<u>RANGE</u>
1	Individual identification	-	-	-
2	Number of freshwater fishing trips in 1983	3.5	1	0-51
	<u>For the typical freshwater fishing trip:</u>			
3	Typical length of trip in days	2.2	1	.2-35
4	Typical one-way distance in miles from residence to site	159	70	.5-4,000
5	Typical time spent fishing in hours	10.4	8	1.5-175
6	Typical total number of fish caught	9.8	5	0-350
7	Typical expenditures for yourself on boat fuel and launch fees	\$32.01	15	\$0-\$2,800
8	Typical dollar amount spent for yourself on terminal tackle, bait, licenses, etc.	\$22.22	10	\$0-\$300
9	Typical expenditures for yourself on food, beverages, lodging	\$68.50	15	\$0-\$2,000
10	Typical expenditures for yourself on gasoline and/or other trans. costs	\$52.46	20	\$0-\$1,500
	<u>Activities participated in during 1983:</u>			
11	Hunting	yes 295 (22%) no 1,057 (78%)	-	-
12	Camping	yes 691 (51%) no 661 (49%)	-	-
13	Tennis	yes 189 (14%) no 1,162 (86%)	-	-
14	Golf	yes 317 (23%) no 1,035 (77%)	-	-
15	Sailing	yes 210 (16%) no 1,142 (84%)	-	-
16	Surfing/swim	yes 637 (47%) no 715 (53%)	-	-
17	Scuba diving	yes 166 (12%) no 1,186 (88%)	-	-
18	Indoor sports	yes 454 (34%) no 898 (66%)	-	-
19	Music/theatre	yes 516 (38%) no 836 (62%)	-	-
	<u>Subscribe to or read on a regular basis:</u>			
20	Sports section	yes 1,041 (77%) no 313 (23%)	-	-
21	Outdoor sports mag	yes 716 (53%) no 636 (47%)	-	-
22	Business periodicals	yes 501 (37%) no 853 (63%)	-	-
23	Wkly news mag.	yes 520 (38%) no 833 (62%)	-	-
24	Spectator sports mag	yes 247 (18%) no 1,105 (82%)	-	-
25	Employed in 1983	yes 1,207 (90%) no 139 (10%)	-	-

26	Average hours worked per week		42.1	40	0-90
27	Number of days of vacation and sick leave		17.0	15	0-95
	<u>1983 household income:</u>				
28	(1) less than \$5,000	8 (.6%)	-	-	-
	(2) \$5,000 - 9,999	17 (1.3%)	-	-	-
	(3) \$10,000 - 14,999	37 (2.8%)	-	-	-
	(4) \$15,000 - 19,999	55 (4.2%)	-	-	-
	(5) \$20,000 - 29,999	188 (14.3%)	-	-	-
	(6) \$30,000 - 39,999	238 (18.1%)	-	-	-
	(7) \$40,000 - 49,999	226 (17.2%)	-	-	-
	(8) \$50,000 - 59,999	178 (13.5%)	-	-	-
	(9) \$60,000 - 69,999	125 (9.5%)	-	-	-
	(10) \$70,000 - 79,999	67 (5.1%)	-	-	-
	(11) \$80,000 - 89,999	39 (3%)	-	-	-
	(12) \$90,000 - 99,999	32 (2.4%)	-	-	-
	(13) over \$100,000	107 (8.1%)	-	-	-
29	Number of adults in household in 1983		2.0	2	1-7
30	Number of children in household in 1983		.7	0	0-6
	<u>Household role:</u>				
31	Principal wage earner	1,122 (82%)	-	-	-
32	Homemaker	16 (1%)	-	-	-
33	Retired	131 (10%)	-	-	-
34	Student	50 (4%)	-	-	-
35	Other	43 (3%)	-	-	-
	<u>Participation in saltwater sportfishing:</u>				
36	(1) less than 1 year	9 (1%)	-	-	-
	(2) 1-5 years	136 (10%)	-	-	-
	(3) 6-10 years	195 (15%)	-	-	-
	(4) 11-20 years	266 (20%)	-	-	-
	(5) more than 20 years	735 (55%)	-	-	-
37	Saltwater fishing is favorite activity	yes 1,122 (85%)	no 205 (15%)	-	-
38	Saltwater sport dived in 1983	yes 240 (18%)	no 1,077 (82%)	-	-
	<u>Current age</u>				
39	(1) less than 18 years	17 (1%)	-	-	-
	(2) 18-25	60 (4%)	-	-	-

	(3) 26-35	291 (22%)	-	-	-
	(4) 36-60	792 (59%)	-	-	-
	(5) over 60 years	181 (14%)	-	-	-
40	Sex	Male 1,283 (98%) Female 20 (2%)	-	-	-
41	County of residence				
	(1) San Diego	159 (11.9%)	-	-	-
	(2) Orange	279 (20.8%)	-	-	-
	(3) Los Angeles	682 (50.9%)	-	-	-
	(4) San Bernardino	48 (3.6%)	-	-	-
	(5) Riverside	31 (2.3%)	-	-	-
	(6) Imperial	5 (.4%)	-	-	-
	(7) Ventura	43 (3.2%)	-	-	-
	(8) Santa Barbara	4 (.3%)	-	-	-
	(9) Kern	4 (.3%)	-	-	-
	(10) San Luis Obispo	5 (.3%)	-	-	-
	(11) Other California	45 (3.4%)	-	-	-
	(12) Outside California	34 (2.5%)	-	-	-
42	Zip Code		-	91701	-
	<u>For typical 1983 saltwater fishing trip:</u>				
43	Would have been working	yes 511 (38%) no 819 (62%)	-	-	-
44	Would have rec'd pymt for that work	yes 487 (95%) no 24 (5%)	-	-	-
45	Hourly rate to be paid:				
	(1) below \$5/hr	6 (1.3%)	-	-	-
	(2) \$5-7.50/hr	12 (2.6%)	-	-	-
	(3) \$7.50-10/hr	19 (4.1%)	-	-	-
	(4) \$10-15/hr	98 (21%)	-	-	-
	(5) \$15-20/hr	100 (21.4%)	-	-	-
	(6) \$20-25/hr	72 (15.4%)	-	-	-
	(7) \$25-30/hr	51 (10.9%)	-	-	-
	(8) over \$30/hr.	109 (23.3%)	-	-	-
46	Have other comments	yes 427 (32%) no 927 (68%)	-	-	-

Table E-8. Key Summary Statistics on Pooled Data - Party/Charter Boat Fishing

<u>VARIABLE DESCRIPTION</u>	<u>MEAN VALUE</u>	<u>MEDIAN VALUE</u>	<u>RANGE</u>	<u>STANDARD DEVIATION</u>
1. Number of P/C anglers who took more than 5 trips in 1983: 418 (41%)				
2. One-way distance in miles from residence to dock site	71.7	45	.1-2,400	105.43
3. Travel time in minutes from residence to dock site	85	60	1-1,500	93.06
4. Number of P/C trips described which were less than or equal to 1 day in length: <u>2,514</u> (76%)	-	-	-	-
5. Number of P/C trips described which were greater than 1 day in length: <u>796</u> (24%)	-	-	-	-
6. Number of described trips in which a principal species was sought: <u>2,744</u> (74%)	-	-	-	-
7. Number of principal species caught on:				
a) albacore/tuna trips	8.4	5	0-110	9.72
b) billfish trips	.9	1	0-2	.73
c) bonito/barracuda/yellowtail/bass trips	7.3	6	0-75	7.21
d) bottomfish trips	12.4	15	0-40	6.02
e) trips for other species	16.1	10	0-90	17.9
8. Number of total fish caught on:				
a) albacore/tuna trips	12.6	8	0-150	14.66
b) billfish trips	6.8	8	1-15	4.87
c) bonito/barracuda/yellowtail/bass trips	11.8	10	0-100	11.05
d) bottomfish trips	14.2	15	0-50	6.79
e) trips for other species	32.6	22	0-100	27.6
9. Expenditures on boat fees:				
a) all trips	\$130.40	\$40	\$0-\$3,000	280.65
b) trips less than or equal to 1 day in length	\$40.49	\$33	\$0-\$1,250	52.84
c) trips greater than 1 day in length	\$464.19	\$310	\$0-\$3,000	468.55
10. Expenditures on terminal tackle, bait, equipment rental, licenses, fish cleaning and processing:				
a) all trips	\$24.15	\$10	\$0-\$900	56.34
b) trips less than or equal to 1 day in length	\$11.05	\$10	\$0-\$650	18.58
c) trips greater than 1 day in length	\$75.34	\$30	\$0-\$900	104.89
11. Expenditures on food, beverages, and lodging:				
a) all trips	\$15.30	\$10	\$0-\$500	27.34
b) trips less than or equal to 1 day in length	\$10.68	\$10	\$0-\$200	11.14
c) trips greater than 1 day in length	\$34.00	\$20	\$0-\$500	53.34
12. Expenditures on gasoline and/or other transportation costs:				
a) all trips	\$13.61	\$10	\$0-\$500	22.24
b) trips less than or equal to 1 day in length	\$10.08	\$6	\$0-\$150	11.52
c) trips greater than 1 day in length	\$26.96	\$20	\$0-\$500	40.53

Table E-9. Key Summary Statistics on Pooled Data - Rental Boat Fishing

<u>VARIABLE DESCRIPTION</u>	<u>MEAN VALUE</u>	<u>MEDIAN VALUE</u>	<u>RANGE</u>	<u>STANDARD DEVIATION</u>
1. Number of rental boat anglers who took more than five trips in 1983: 8 (7%)				
2. One-way distance in miles from residence to rental boat site	31.9	27	1-380	33.77
3. Travel time in minutes from residence to rental boat site	49	45	3-420	44.2
4. Number of rental boat trips described which were less than or equal to 12 hours in length: 226 (98%)	-	-	-	-
5. Number of rental boat trips described which were greater than 12 hours in length: 4 (2%)	-	-	-	-
6. Number of described trips in which a principal species was sought: 141 (61%)	-	-	-	-
7. Number of principal species caught on:				
a) sandbass, halibut, crocker trips	5.5	5	0-35	5.28
b) bonito, barracuda, yellowtail, bass trips	6.9	5	0-27	5.23
c) rockfish trips	30	32.5	10-45	14.71
d) trips for other species	5.75	4	3-12	4.27
8. Number of total fish caught on:				
a) sandbass, halibut, crocker trips	9.5	10	0-40	6-6
b) bonito, barracuda, yellowtail, bass trips	11.3	10	0-30	6.4
c) rockfish trips	31.2	35	10-45	15.47
d) trips for other species	6.7	5	5-12	3.5
9. Expenditures on boat fees and fuel:				
a) all trips	\$39.11	\$26.50	\$0-\$1,000	88.47
b) trips less than or equal to 12 hours in length	\$33.37	\$25.00	\$0-\$1,000	67.4
c) trips greater than 12 hours in length	\$344.50	\$350.00	\$28-\$650	352.87
10. Expenditures on terminal tackle, bait, equipment rental, licenses, fish cleaning and processing:				
a) all trips	\$5.77	\$5.00	\$0-\$50	6.04
b) trips less than or equal to 12 hours in length	\$5.62	\$5.00	\$0-\$50	5.91
c) trips greater than 12 hours in length	\$15.25	\$13.00	\$10-\$25	7.08
11. Expenditures on food, beverages, lodging:				
a) all trips	\$10.44	\$6.00	\$0-\$350	33.09
b) trips less than or equal to 12 hours in length	\$10.43	\$6.00	\$0-\$350	33.44
c) trips greater than 12 hours in length	\$8.75	\$7.50	\$0-\$20	10.3
12. Expenditures on gasoline and/or other transportation costs:				
a) all trips	\$7.12	\$5.00	\$0-\$50	8.4
b) trips less than or equal to 12 hours in length	\$6.92	\$5.00	\$0-\$50	8.31
c) trips greater than 12 hours in length	\$12.50	\$12.50	\$10-\$15	2.88

Table E-10. Key Summary Statistics on Pooled Data - Beach and Bank Fishing

<u>VARIABLE DESCRIPTION</u>	<u>MEAN VALUE</u>	<u>MEDIAN VALUE</u>	<u>RANGE</u>	<u>STANDARD DEVIATION</u>
1. Number of trips made to a beach or bank site in 1983	10.7	5	0-182	17.3
2. Typical one-way distance in miles	38.5	20	0-500	53.07
3. Typical one-way travel time in minutes	57	40	0-720	69.24
4. Typical time spent fishing in hours	5.2	4.5	0-40	3.58
5. Typical number of fish caught	5.3	4.25	0-50	4.55
<u>Typical expenditures for yourself on:</u>				
6. Terminal tackle, bait, licenses, fish cleaning and processing	10.04	\$5	\$0-\$150	14.63
7. Food, beverages, and lodging	12.73	\$5	\$0-\$500	37.28
8. Gasoline and/or other transportation costs	10.81	\$5	\$0-\$250	19.58

Table E-11. Key Summary Statistics on Pooled Data - Fishing from Piers, Jetties, and other Man-made Structures

<u>VARIABLE DESCRIPTION</u>	<u>MEAN VALUE</u>	<u>MEDIAN VALUE</u>	<u>RANGE</u>	<u>STANDARD DEVIATION</u>
1. Number of trips made to a pier, jetty, or other man-made structure in 1983	5.6	2	0-200	14.2
2. Typical one-way distance in miles	27.2	20	0-300	34.73
3. Typical one-way travel time in minutes	44	30	0-360	43.15
4. Typical time spent fishing in hours	4.6	4	0-13	2.03
5. Typical number of fish caught	5.2	4	0-30	4.3
<u>Typical expenditures for yourself on:</u>				
6. Terminal tackle, boat, licenses, fish cleaning, and processing	\$7.78	\$5	\$0-\$50	7.32
7. Food, beverages, and lodging	\$6.89	\$5	\$0-\$100	11.4
8. Gasoline and/or other transportation costs	\$7.22	\$5	\$0-\$125	10.79

Table E-12. Key Summary Statistics on Pooled Data - Private Boat Fishing

<u>VARIABLE DESCRIPTION</u>	<u>MEAN VALUE</u>	<u>MEDIAN VALUE</u>	<u>RANGE</u>	<u>STANDARD DEVIATION</u>
1. Typical one-way distance in miles from residences to dock site for private boat fishing	38.7	20	0-1,400	69.73
2. Typical travel time in minutes from residence to dock site for private boat fishing	54	30	0-900	66.89
3. Typical time spent fishing in hours for private boat fishing	8.3	8	1-50	5.05
4. Number of described typical trips in which fishing was typically less than or equal to 12 hours 1,844 (93%)				
5. Number of described typical trips in which fishing typically exceeded 12 hours 143 (7%)				
6. Typical boat fuel expenditures for yourself on:				
a) all typical trips	\$44.95	\$25	\$0-\$650	59.56
b) typical trips where fishing was less than or equal to 12 hours	\$40.03	\$25	\$0-\$650	51.66
c) typical trips where fishing exceeded 12 hours	\$107.54	\$80	\$0-\$600	105.14
7. Typical expenditures for yourself on terminal tackle, bait, etc. for:				
a) all typical trips	\$19.53	\$10	\$0-\$500	28.98
b) typical trips where fishing was less than or equal to 12 hours	\$18.43	\$10	\$0-\$500	27.63
c) typical trips where fishing exceeded 12 hours	\$35.68	\$20	\$0-\$200	42.74
8. Typical food, beverages, lodging expenditures for yourself on:				
a) all typical trips	\$17.95	\$10	\$0-\$600	28.98
b) typical trips where fishing was less than or equal to 12 hours	\$15.59	\$10	\$0-\$200	21.31
c) typical trips where fishing exceeded 12 hours	\$45.39	\$25	\$0-\$600	68.67
9. Typical expenditures on gas and/or other transportation costs for yourself on:				
a) all typical trips	\$12.17	\$6	\$0-\$400	20.56
b) typical trips where fishing was less than or equal to 12 hours	\$11.61	\$6	\$0-\$400	19.90
c) typical trips where fishing exceeded 12 hours	\$17.96	\$10	\$0-\$160	21.71
10. Typical total expenditures on yourself for:				
a) all typical albacore/tuna trips	\$127.30	\$90	\$0-\$925	119.72
b) typical albacore/tuna trips where fishing was less than or equal to 12 hours	\$112.74	\$85	\$0-\$925	102.68
c) typical albacore/tuna trips where fishing exceeded 12 hours	\$209.60	\$172.50	\$10-\$825	167.29
11. Typical total expenditures on yourself for:				
a) all typical billfish trips	\$166.51	\$125	\$0-\$1,025	150.22
b) typical billfish trips where fishing was less than or equal to 12 hours	\$149.08	\$115	\$0-\$1,025	136.42
c) typical billfish trips where fishing exceeded 12 hours	\$274.79	\$235	\$10-\$800	183.70
12. Typical total expenditures on yourself for:				
a) all typical y/b/b/b trips	\$69.43	\$50	\$0-\$520	66.36
b) typical y/b/b/b trips where fishing was less than or equal to 12 hours	\$66.84	\$47	\$0-\$520	64.10
c) typical y/b/b/b trips where fishing exceeded 12 hours	\$135.12	\$135	\$31-\$305	81.43
13. Typical total expenditures on yourself for:				
a) all typical bottomfish trips	\$65.07	\$47	\$0-\$800	61.78
b) typical bottomfish trips where fishing was less than or equal to 12 hours	\$63.47	\$46	\$0-\$800	59.01
c) typical bottomfish trips where fishing exceeded 12 hours	\$129.09	\$115	\$20-\$370	97.25
14. Typical total expenditures on yourself for:				
a) all typical trips for other or no principal species	\$62.80	\$45	\$0-\$495	63.94
b) typical trips for other or no principal species where fishing was less than or equal to 12 hours	\$60.37	\$45	\$0-\$425	53.19
c) typical trips for other or no principal species where fishing exceeded 12 hours	\$39.88	\$32	\$15.50-\$80.05	28.07